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NEWSPAPER

CW Photo by V.J. Farmer

Highlight of the ICL booth was its 2903 computer system.

ICL 2903 to Enter U.S.; Billed as S/3 Competitor

By Vic Farmer

Of the CW Staff

MONTREAL – ICL Ltd. introduced its 2903 computer system to North America at the Canadian Computer Show and Conference here last week.

Although 90 other exhibitors were here, there were several firms representing two, three and even seven U.S. manufacturers making the equipment on display quite large.

Pegged to compete with IBM's System/3 line, the ICL 2903 will be introduced in New York this week. However, ICL is planning to limit sales of the 2903 to the greater New York area at first.

The small computer system was originally introduced 18 months ago in Europe and to date the firm claims orders in excess of 750 systems and installations in about 275 sites. Two 2903s are installed in New York, one at ITT and one at Nat Sherman, a tobacconist.

The 2903 system employs integrated circuitry and microprogramming. Main memory is MOS semiconductor and ranges from 16K to 48K 24-bit words. Cycle time is 1,140 nsec, ICL said.

Up to eight data entry CRT stations can be used and eight additional CRT terminals can be attached as options to access a data base.

Through use of a Telephone Data Terminal Facility the system can be used as intelligent satellite to a larger system, specifically to an IBM 370 CPU, ICL said.

The fixed and exchangeable disk drives have a minimum storage capacity of 10M characters and disk storage can be expanded to 250M character.

Line printers are available that range from 300 line/min of 132 char./line up to 1,100 line/min.

Other peripherals available include magnetic tape units, card readers and punches, and paper tape readers and punches.

The four languages available are: RPG II, Cobol, Fortran and Algol.

Customer Centers

ICL operates partially bundled and one of the prime reasons it is limiting U.S. sales to the New York area is its need to set up customer centers. The three customer centers in North America will be located in New York, Toronto and Montreal.

ICL claimed users who have signed contracts will be able to get RPG II language training, operator training, program testing and systems support at no additional

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ACM's Turing Award Winner:

No Single Style Superior In 'Art' of Programming

By Don Leavitt

Of the CW Staff

SAN DIEGO – The programmer is, and should be, an artist, if the true meaning of the word "art" is understood and the programmer appreciates his responsibilities, Prof. Donald Knuth told the Association for Computing Machinery (ACM) as he accepted the group's highest honor, the A.M. Turing Award.

Acknowledging that the goal of ACM publications has generally been to turn programming into a science, he argued that the goal was a false one, even though the basis of programming might depend on scientific principles. The application of such principles is an art, he stressed.

The scientific approach is characterized by calm, restrained, rational behavior devoid of any immediate value. Programming, on the other hand, is an art form in an aesthetic sense. Preparing a program, Knuth said, is "like writing poetry or music. It must follow often complex but consistent rules to be effective and satisfying."

Program listings can he elegant, exquisite or sparkling – "perhaps even 'noble' " – and style is coming to the fore at last. There is, however, no one "best" style; no one should force anyone else into working in a style that is unnatural to him, the professor added.

While there should be no rigid rules to define "good" or "bad" style, there tends to be one basic consideration that tells the programmer whether his work is good or bad. The utility of the resulting program, even if it does an essentially playful job, is a valid rule of thumb, he said.

Author of three volumes of a planned seven-volume series on the art of computer programming, Knuth said programmers have "good" style if their programs work and if they are easily changeable as requirements change.

They should also "interact gracefully with the user," including the use of "pleasant messages to the operator" and input requirements that are reasonable to meet. The coding should be efficient, but not at the cost of added complexity of logic, he added.

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"Premature optimization is the root of all evil [for the programmer]," Knuth quipped in an aside, "even though there is a time and a place for efficiency." Good programmers, he noted, enjoy accomplishing something working with limited tools. "That is why so many programmers really enjoy working with minis, especially after a project on a large mainframe."

Programming chores may not all be "fun," he said, but even routine jobs can be pleasurable, and more effectively done if the programmer has good tools.

Speaking for the application programmers, he pleaded with systems programmers, "Give us tools that are pleasant to work with, not things that we have to fight with." Some of the features now available might be good, he admitted,

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Standards Effort, User Needs at Odds

By Edith Holmes

Of the CW Staff

SAN DIEGO – Movement toward a workable trade-off between the establishment of standards and the recognition of user needs in developing interactive programs remains in a primitive state, panelists at an ACM '74 session here agreed last week.

"Most 'user-oriented' interactive programs rely on both the characteristics of the particular hardware/software configuration for which they have been developed and a set of ad hoc techniques which the program designers have implemented to provide a workable man-machine interface in that environment," Anthony I. Wasserman of the University of California at San Francisco and chairman of the panel explained.

Problems arise because "these techniques are poorly documented and there are no programming language standards for the development of conversational programs," he added.

As a result, Wasserman noted, the level of user-orientation to interactive programs varies greatly and it is difficult to transfer programs among different computing installations.

Considering the User

Speaking to systems designers in particular, Richard L. Venezky of the University of Wisconsin accepted what he called "a legitimate challenge to show that user-oriented programs are necessary and important.

"Ultimately, systems people design for everyone, but two specific kinds of users should be considered: special users, who have some programming knowledge and who are interested in the content of what their systems will be doing, and general users, who will tend to define what they want their system to do in basic computer terms," he said.

Venezky noted users can be further identified as those who operate on a casual basis and those who run their systems around-the-clock.

Systems should be designed to accommodate the special and the general user, the user who goes to the system infrequently enough to forget how to operate it and the user who employs his system so

(Continued on Page 2)

GAO Blasts Poor Documentation In Government's DP Projects

By Nancy French

Of the CW Staff

WASHINGTON, D.C. – Millions of taxpayer dollars and years of programming effort are being wasted due to poorly documented computer programs within the Federal Government, according to a recent report of the General Accounting Office (GAO).

Of 710 data processing professionals in more than 70 federal computer installations who responded to a recent GAO survey, 478 reported excess time is required to modify existing programs, 341 reported difficulty in evaluating internal controls and 272 reported management review problems.

To meet target dates, the report said, many programmers admitted omitting documentation altogether or preparing incomplete documentation.

Manpower limitations make it difficult to document modifications on a timely basis, the report said.

Programmers said they "use their own judgment" when determining what documentation to prepare for each program rather than adhering to any agency standards.

Without good documentation, according to the GAO report, auditing a system

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'Turn Back to Belief in God'

'Numbers' Overshadow Human Concerns

By Edith Holmes
Of the CW Staff

SAN DIEGO – Unless the computer industry learns to question its use of numbers and its quantitative view of the world into a perspective allowing for other, more human concerns, it will be left with nothing but numbers, Robert S. Barton, director of engineering for systems research with Burroughs Corp., said at the opening session of the annual conference of the Association for Computing Machinery (ACM) here last week.

"We've built a society based on science, and on the surface that society is full of numbers," he told the audience filling the San Diego Convention Center for ACM '74. "As a result, we rely on our marvelous ability to deal with numbers and logic and to create elaborate computer models to solve our many problems.

"But what we are measuring and modeling really isn't very quantitative. Problems today are characterized by qualitative, nonlinear phenomena that don't fit into the linear models we continue to use," Barton said.

Numbers themselves, while increasingly available, are also increasingly incomprehensible, he remarked. While pocket calculators have made involved calculations more accessible, Barton noted they haven't increased the ability to comprehend large figures.

"Numbers are being degraded, devalued partly because we can no longer see what they mean," he said.

Barton added that numbers are constantly misused, particularly by the trade press. "Both *Computerworld* and *Electronic News* use numbers as though they constituted a sublanguage.

"Some 30% of the words these publications use refer to machine numbers, peripheral numbers, capacities, speeds and performance measurement figures," he commented.

Advocating a different way of looking at numbers and computers, Barton urged the abandonment of the scientific, production-oriented view in favor of a new emphasis on people.

Numbers constitute only one means of viewing the world and "computers should be seen strictly as a medium for facilitating people-to-people communications," he stressed. "Nothing else really matters."

Barton indicated that a redefinition of the place of science and production and of the importance of numbers and computers in society is essential to human survival.

"Ten years ago, I thought we could make the right decisions so long as we could build and test computer models. Five years ago, I began to question that idea. Now I know our situation is quite hopeless unless we rid ourselves of the notion that if we can't measure it, we can't understand it," Barton said.

"Our only hope is to turn away from our belief in numbers, to think more about people and the quality of life, to turn back to a belief in God," he concluded.

Standards Effort at Odds With User Requirements

(Continued from Page 1)

often that he would be both bored and frustrated by extensive prompting, Venezky asserted.

Beyond these general specifications, users must have a definition of the capabilities of the system, he told designers. Users also need to know the operational characteristics of the hardware device used to access their systems, whether the devices are CRTs or teletypewriters.

Venezky emphasized the importance of teaching users how to specify the tasks they want performed and what their most effective means of error correction are.

Users should also be given means of monitoring tasks to determine whether a job has been completed, he said. Finally, they should be instructed in the ways of interpreting their output, Venezky said.

"If we are serious about incorporating standards in interactive programs, we need to standardize error messages, to pursue terminal standards more rigorously, to encourage the inclusion of 'help' and 'information' modes, to develop many levels of system diagnosis and to improve interaction with the system through 'control' and 'prompt' modes and by providing the capacity for immediate interaction with a human being who can at least begin to address a user's problem," he suggested.

Psychological Factors

In his presentation Wasserman urged systems designers to consider a variety of psychological factors when building a system. He added that none of these factors could be easily standardized.

Designers can improve the willingness of a user to accept a system by involving that user in plans for its design and use, he said. In particular, Wasserman suggested systems people be aware of the threat users may perceive should they fear replacement by an automated system.

He emphasized the importance of user training, stressing the need for separate introductory and reference documentation. "Individualized training has been especially successful," he indicated, "particularly where users train other users."

Wasserman noted the importance to the user of terminal reliability and data integrity and security but suggested "the ease of use or computer system invisibility" is the key to user acceptance."

Building on the remarks made by Wasserman and Venezky, M. Granger Morgan of the Brookhaven National Laboratories and Carnegie Mellon University said research for humanizing computer systems for users, whether they are technically or nontechnically oriented, is still at the basic stage.

"The basic barrier to research in humanizing interactive systems is not funding constraints, but the limited imaginativeness of most proposed research," Morgan remarked.

He concluded the humanization of systems is primarily a problem of engineering design but indicated the design process itself is still in the art form rather than at the scientific state.

The National Science Foundation (NSF) has an active program for developing the man-machine interface, Morgan said. But, he added, "we do need several large federally funded demonstration projects" to illustrate the results of this research.

He suggested NSF's best civil-sector approach to this task would be to fund the best artists, to weigh support toward "low-cost" approaches and to continue to watch for generalized knowledge in order to speed the transition of system humanization from art to science.

Representing the NSF, Robert P. Blanc described foundation efforts through the Arpa network to develop common system command languages, front-end translation for these languages and network access machines which would permit users to define their own command language.

Blanc indicated a combination of these approaches would probably create the best chance for maximizing standards while meeting user needs.

Programming Viewed as Art Form

(Continued from Page 1)

"but they take too much storage."

The implementors of IBM's Job Control Language and other system command schemes were rapped by Knuth for the clumsiness of their requirements. "Imagine spending a fair bit of lecture time telling students that programming is an art form," he said, "and then having to tell them that before the program can be used, they have to punch up a job card."

Hardware designers also felt Knuth's almost cynical challenge. "Why can't we have a floating point processor that follows simple mathematical laws," he asked, "instead of making the mathematician rephrase his needs in some way to meet the processor's requirements?"

Software routines "should not be too automatic," he said, even though libraries are a valid support capability. "Some tasks are best done by machine," Knuth admitted, "but some are best left to the insight of the programmer at the time the coding is needed."

And computer performance evaluation efforts, growing in popularity with management, can and should be shared with the programmers. "Treat them as the people they are. Tell them what is being done inside the computer and why. Most programmers want feedback about the real costs of what they are doing," Knuth said.

Language designers should also encourage application program style, he noted in conclusion, "but none of those in serious use today is really independent enough of data forms and other constraints to be a real help to the programmer."

ACM to Emphasize Practitioners

SAN DIEGO – Members of the Association for Computing Machinery (ACM) think the organization should be doing more for "practitioners" of data processing and perhaps decrease the current emphasis on academic issues, an open forum between ACM's members and offices at ACM '74 here last week indicated.

But a long range planning (LRP) committee may have beaten them to the punch.

Jean Sammett, ACM's president said the LRP report, which is ready for presentation to the executive committee and ACM council, recommends that more material be published for practitioners in the organization's regular monthly magazine *Communications* and that a publication devoted strictly to business DPers be started by ACM.

The new publication suggestion received spotty reaction from the audience, but there was general approval of a switch in emphasis toward practitioners.

How to Implement

The problem in implementing such a suggestion is the makeup of ACM itself and what appears to be a dearth of material submitted to *Communications* and related specifically to business or practitioners' needs.

However, any growth in ACM membership, which has stabilized at around 26,000 in recent years, is likely to come from new people in the business arena, according to ACM's vice-president Dr. H.R.J. Grosch.

ACM's membership in general is probably satisfied with the organization's current emphasis and direction, while the practitioners in the audience represented a minority that will grow as new business people join the association, he predicted.

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ICL 2903 to Make U.S. Entry; Intended to Compete With S/3

(Continued from Page 1)

cost through these centers. The centers will also have a "full" range of facilities including batch processing, direct data entry, multiprogramming and application packages. These centers, ICL said, "should allow a potential user to set up his system programs and train staff prior to CPU installation."

The minimum 2903 consists of the CPU, 16K main memory, 10M-character disk storage, 300 line/min printer and a card reader and will cost $1,860/mo. The systems can be expanded, however, to $7,400/mo with additions of extra memory, disk storage, CRT terminals and other options.

ICL has not yet announced any further upward migration path system in the U.S. for users needing more power, but a spokesman said larger machines will be available within 18 months to two years in the U.S. The price of the smaller 2903 systems is close to IBM's System/3 prices, but the spokesman explained that larger 2903 configurations should average 10% below the price of comparable IBM systems.

In other areas, Centronics announced two 165 char./sec. impact printers, the models 301 and 501. Both machines use either a 5 by 7 or 9 by 7 dot matrix print head to print a format consisting of 10 char./in. horizontally and 6 line/in. vertically.

Deborah Kuznitz, an Interdata support analyst, demonstrated the firm's new 7/32 minicomputer.

Trans-Canada Telephone drew interest with its Vucom 2 (Raytheon PTS-100) terminal offering.

CW Photos by V. Farmer

The Canadian Computer Show provided a good cross section of manufacturers' products.

The 301 is an 80-column wide printer; the 501 is 132 columns wide.

The 301 is priced at $2,255, the 501 at $3,445 with standard Centronics interfaces priced separately.

Prototype Printer

Centronics also had on display a prototype of a 132-column printer that used standard 8-1/2 in. wide paper to see if users showed any degree of interest. Centronics is at One Wall St., Hudson, N.H. 03501.

The show also brought some recently introduced equipment on display for the first time including Interdata's 7/32, a 32-bit word minicomputer, the Data General Eclipse and Modular Computer Systems, Inc.'s Modcomp II, a new version of its line of minis using 32K-word core memory boards.

Trans-Canada Telephone displayed its new Vucom 2 IBM 2260/3270-compatible terminal that operates on its all digital Dataroute. The Vucom 2 is a slightly modified Raytheon Programmable Terminal System, the PTS-100.

Economic, Ethical Issues Magnify 'Information Crisis'

By Nancy French
Of the CW Staff

SAN DIEGO – The DP industry is in an "information crisis" and will get out of it only after it solves the mechanical and economic questions of how to handle the information and the ethical question of who actually owns the information and how much it is worth, ACM members were told last week.

CW at ACM

And it will take creation of systems that help rather than thwart the public in obtaining public information and coping with the "explosion" of conventionally published materials before the crisis is finally resolved.

An overflow audience heard panelist Robert Korfhage of Southern Methodist University ask why – "with all the facilities, knowledge and ability we've got to manipulate data" – accurate, timely information cannot be obtained.

Public and professional apathy is partly to blame, as is "excessive zeal to protect information that should be public knowledge," he explained.

Korfhage suggested forming a "Better Information Bureau" much like a Better Business Bureau to keep tabs on information systems.

Who Owns the Data?

Dr. H.R.J. Grosch, ACM vice-president, believes the information crisis is not merely an issue of privacy and security but rather a matter of "the value of information and the ethics of information storage and retrieval.

"It's not just a matter of the department store making sure your bill is right or that your FBI file or a juvenile delinquent child's file be in order. The question is who owns the information?" he said.

"Personal data should be the property of the person about whom the information pertains – whether it's fingerprints, criminal records, marital history or employment record," Grosch said.

"Giving it away to a department store or anybody else is a 'one-time' favor. Others have no right to give that information away or to sell it.

"But no law existing recognizes this principle," Grosch sighed.

When we release that information, we should be asking ourselves not only how many bits do we get for the buck but, rather, should we release the information at all, is the Information ours to release and how much should we charge, he added.

Library Problems

Shifting to another area of concern, Gerald Salton of Cornell University noted that libraries, the present day centers for information, are "bursting at the seams.

"There is too much information to store, it's too expensive to inquire and we don't have the equipment to store it if we could afford it," he said.

"We're farther from, rather than closer to, the concept of the 'intellectual Cadillac' proposed about 10 years ago to provide every man who wanted it access to mass amounts of Information through individual computer terminals.

"And things will be worse by the year 2000," Salton predicted.

The Cornell Library has 4.5 million items with no way to identify and remove them or to restructure their priority, he said.

"We have computer systems that handle individual responses from individual libraries that, piecemeal, keep track of borrowers. We have systems that make acquisition easier.

"What we need is enormous files plus real time control," he said, "and that can't be done yet in the library."

Pointing to success in limited areas, Salton described cooperative or networking ventures in which libraries join forces and acquire only part of what they need, borrowing the rest from the other members.

But this defeats the principle value of the library which is based on "the number of materials stored, not merely accessible," he said.

Message Not Same As Storage Medium

SAN DIEGO – There's a difference between information and the media on which it is stored and, when people find out they don't have to move the media around to get that information, part of the "information crisis" will be solved, according to Jack Belzer of the University of Pittsburgh.

Chairman of the ACM's session on the information crisis, Belzer compared present thinking on information storage and retrieval to "breeding a faster horse" instead of developing the automobile.

He called for new solutions, among them "information regeneration."

Libraries, for example, could be reduced by extracting and storing only the essential information from the many books published on any given subject, he said.

In the case of a research project, the Information could be stored and then "re-created as needed," he said.

Awareness, Quantification Seen Ways for Improving Business DP

By Don Leavitt
Of the CW Staff

SAN DIEGO – Commercial installations need better means of developing reference points for many of their activities, speakers at an ACM session on methods for business DP agreed.

The means may stretch, as the presentations showed, from awareness of the constraints of data base management systems (DBMS) to development of ways of identifying – and quantifying – factors that can impact the installation's operations.

Since DBMS comes between the user and the stored data, it impacts the way the data is stored, how the application programs function and how the end user interacts, IBM Fellow Mary E. Snuggs said. No current implementations meet all the objectives of transparent data management, and the degree to which they fail determines the degree to which trade-offs of objectives and resources must be considered, she added.

The limits of software capabilities are secondary to the user vision of what would be significant events in the life of a company or department, according to John Dolan of Weyerhaeuser Co., who described a computer-based conferencing technique to define objectively and quantitatively just such a vision.

The so-called Delphi method of conferencing was modified somewhat by Weyerhaeuser to run its impact analysis, Dolan said. After managers defined general factors that might affect their specific operations, a questionnaire was prepared, in matrix form, to help managers pinpoint the monetary value involved if one of these events actually took place.

Managers answered the questionnaire anonymously through entries on local terminals.

At the central computer installation, the coordinator summarized the results and sent back to each manager his own responses and the range of all responses.

Respondents were then allowed to change their ratings, with a consensus the hoped-for but not necessarily the achievable goal.

Project managers went through a computation process, multiplying the scaled monetary value for each event by a factor representing the likelihood of its happening.

The result, Dolan pointed out, was a rank order list, with comparative values shown, of the events and their impact potential.

In her presentation, Snuggs outlined the anticipated advantages of using DBMS and pointed out that each apparent advantage tended to be a restraint in fact. She admitted "at present it is not known how best to meet all of these objectives concurrently."

A DBMS should have built-in capabilities to meet the objectives of data independence, relatability, compatibility, structural adaptability, integrity, recoverability and security, she said.

Software Physics Buffs Agree Only on Future Utility

By Edith Holmes
Of the CW Staff

SAN DIEGO – Software physics should only be pursued if it can be applied to the present needs of computer users, a panelist told an ACM '74 audience during a session on the controversial subject here last week.

Defining software physics as "an attempt to extend natural physics to meet the requirements of computer measurement," Kenneth Kolence, a consultant in Palo Alto, Calif., said the new discipline must correspond exactly to the laws of natural physics if it is to have any validity.

But while they acknowledged that, ultimately, software physics should find some practical application, panelists sharing the podium with Kolence tended to support the concept only as an initial building block in devising "a science of computing." Similarly, they contended, software physics exhibits properties related to but not the same as those of natural physics.

Insisting that software physics be developed "to solve real and important problems," Kolence defined the domain of the subject as "measurements of system variables resulting from the action of software on a configuration or subconfiguration."

Within this framework, software energy and work are equivalent to energy and work in natural physics; configurations and subconfigurations are comparable to physical systems, and system workloads become forces, he said.

"The processor does one unit of work on a storage medium when the device causes one byte (or one bit) of that medium to be altered," he explained. By plotting energy or work against time and software existence potential and realization, Kolence acquired the power, storage capacity and energy density parameters needed to define his theory of software physics.

He further defined three areas requiring the initial attention of software physicists. "We must establish a fundamental definition of configuration capacity; we need to define how to measure the capacity usage of an arbitrary workload or workload component; and we should devise a means of calculating the capacity available relative to some workload," he said.

While he, too, sees software physics as a means to understanding the relationship between software systems and the machine resources they require, John E. Savage of Brown University disagreed that the discipline has progressed to the point of sound general theory and notation. "We have yet to determine whether laws exist which govern considerations like storage-time trade-offs," he commented.

Savage defined the software physics problem as: "Given particular values for space and time, how can we calculate the work a system can do?" He suggested that any work a system does is a function of its complexity. Accordingly, his theories center on measuring that variable.

Based on his venture into software physics thus far, Savage said his calculations indicate "that storage can be traded for time in a system, and vice versa, and that multiprogramming and multiprocessing encourage efficient computing.

Concurring with Savage, Leo Hellerman of IBM Germany argued it is too early to say which of the approaches to measuring data processing systems will be best. "We need more experience to see how useful each of these theories is in practice," he said.

He viewed the theoretical task of software physics as finding that implementation of an arbitrary process that requires the least amount of work. "Then we must learn to compute the work of the primitives of some high-level language, like APL, so a user can be told how much work his program actually did," Hellerman continued.

Stuart H. Zweben of Ohio State University looked specifically at the variables Hellerman mentioned. His theory of software physics dealt with measures of program size, or volume, and the level of language used.

Zweben said his approach leads to observations such as "the bigger the program, the lower the level of language," and to ratios, like volume/level of language, which give the user some measure of the effort required to write a program.

And with due regard to the practicality of software physics, he indicated this particular ratio has been demonstrated to be useful in deciding what characterizes "good" modularization in program writing.

Despite the differences in their definitions of software physics, all of the panelists agreed that a closer relationship exists between the computer sciences and the physical sciences than they initially acknowledged.

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GAO Study Blasts Poor Documentation

(Continued from Page 1)

becomes difficult; new programmers can't work on programs developed by someone else; program sharing potential drops; and rather than modifying existing systems, whole programs often must be rewritten.

Good documentation, the report said, should communicate the following information about a system:

- Purpose of each program and how to run it.
- Format and flow of data through the computer system.
- Logic of the operations performed by the computer.
- Controls included to insure the validity and integrity of the data being processed and the results.
- Limitations and assumptions incorporated in the operation or program.

The first problem to be faced, GAO said, in instituting good documentation is setting standards.

The second is establishing review functions to assure that work necessary for good documentation is performed.

The report recommended that standards now being developed by a National Bureau of Standards task force be adopted throughout the government.

The report, entitled "Improvement Needed in Documenting Computer Systems (B-115369), is available for $1 per copy from Reports Distribution Section, U.S. General Accounting Office, Washington, D.C. 20548.

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Defines the Data Base system, elaborating its quantitative and qualitative aspects. Examines the role of the Data Base management package and the complete structure of the Data Base project. Presents the commitment to on-going management, and develops the concept of the Data Base administrator. Investigates the staffing requirements and training commitment for development and maintenance of the talent levels necessary for a successful Data Base system project.

2 DATA BASE PROJECT PLANNING AND COST/BENEFIT ANALYSIS (2 days)

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3 DATA COMMUNICATIONS FOR DATA BASE (2 days)

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Panelists View CPE Objectives As Extension of Company Goals

By Edith Holmes
Of the CW Staff

SAN DIEGO – Users must study the performance of their computer systems in terms of objectives defined by the overall goals of their organizations – and not necessarily in terms of some set of specific standards, panelists told an ACM session on "user experience with computer performance evaluation" (CPE).

Consultants Louis Desiderio, Dennis Salosky and Sal Catania from Coopers and Lybrand called this the common denominator that should be used for any attempts at CPE, whether run by a user's own staff or by outside consultants.

"While day-to-day evaluation is essential, it isn't necessary that these studies be comparable to the approach taken by consultants to improve hardware performance," Catania said.

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"Neither hardware nor software monitoring is appropriate in this kind of evaluation, because these measures don't include the daily influences people have on the system."

In addition, Catania indicated the typical consultant's approach generates far too much detail to be collated and reviewed by the manager of a DP center on a daily basis.

"He simply doesn't have time to look at 24 hours of CPU, disk and tape utilization data every day," the consultant noted.

Objectives must be broad enough to relate to company goals, yet specific enough to allow for their measurement at the DP site, he said.

With little time in which to assess their function, DP managers might concentrate on such general, yet specifically measurable, parameters as the availability of the system to in-house users and the turnaround time normally required by the computer.

Similarly, the consultant's aim in performing a system evaluation for a client is to help DP management make informed hardware acquisition, configuration and project scheduling decisions, based on the demands placed on the DP function by corporate needs, Salosky commented.

Working with a client in the health care field, Salosky recalled Coopers and Lybrand was asked to help the institution maximize the overlap of its utilization of resources before its operation was expanded to include some 70 terminals.

Specifically, the consulting firm was contracted to determine the reserve capacity of the IBM 370/158 and 145 systems used by the institution, to identify any imbalances in these configurations that might affect performance and to investigate a new teleprocessing system to determine the causes of its unacceptable response time, according to Salosky.

Using hardware monitors and accounting data, the consulting firm determined the institution's DP center should balance the system activity of the 145 by moving three data sets and nine packs off the CPU, "tune" the configuration of its system by making some of the transient OS routines core-resident and use the cylinder overflow option on the collection file of its teleprocessing system.

These and several other recommended changes helped put the DP center at the institution in a better position to evaluate its readiness to implement the institutional goal of expanding the system to include on-line terminals in 70 areas.

The Measurement 'Fad'

By Edward J. Bride
Of the CW Staff

SAN DIEGO – The current emphasis on computer performance measurement has almost become a "fad," and some users may be wasting money on too much of a good thing, according to Cmdr. Jan Prokop, head of the Navy's ADP Equipment Selection Office.

There is a "lot of pontificating" on performance measurement today, he said, while measurement "is the type of thing that people with good sense have been doing for some time."

Yet it is bad to "measure enthusiastically" in that system overhead and actual dollar expenditures can bring a waste factor into any reported savings, he noted at an ACM session here.

The economic factors sometimes reported by users as tremendous savings are often exaggerated, he continued, especially with some government reports.

Sometimes people costs are not included in the cost of measurement, he noted, despite the fact that hardware monitor operators are additional personnel required for the measurement effort.

He also noted that some savings are really "cost avoidances" and it is often difficult to spend that money other than where originally approved.

System degradation, common with software monitors, is another factor that is often ignored when users report savings due to performance measurement, he continued.

As an aside on the economic factor, Prokop commented that measurement is done because of the high cost of machines, and yet most shops spend more money on people than on hardware.

He also called on managers to set specific goals against which their systems could be measured. If there are no specific goals, such as response time improvement, then people are "wasting money" on monitors, he added.

People today are fascinated with nanoseconds and CPU time, yet "we argue over whether 90% CPU usage is too high or too low," he said.

Another speaker in the sparsely attended session noted the importance of goals especially during any kind of conversion. Dean Fitzbag of Electronic Data Systems commented that things normally are run "sloppily" during a conversion, and specific goals help management keep conversion and the existing operation in line.

Increase DP Effectiveness

Formal Programming Can Simplify User Interface

By Don Leavitt
Of the CW Staff

SAN DIEGO – A need exists to simplify the interface between the user and the computer in order to increase the effectiveness of data processing.

This need can be satisfied in many ways, among them the development of formalisms in the programming process, according to ACM SigBDP chairman Bruce Wrigley of Travelers' data center, who was also chairman of an ACM session on language developments for the user.

Covering an early portion of a programming project life cycle, Dr. David M. Sherr of Temple University proposed a "nonprocedural programming language for structured systems development."

Sherr shied away from the term "automatic programming" in connection with his project, noting "even assemblers were considered 'automatic programming' tools when they first appeared."

Instead, he stressed that the user, the designer and the implementor (or programmer) all have assigned roles in the use of his information system (IS) specification standards.

IS specification standards define what pieces are needed for the desired information systems, include descriptive "and prescriptive" elements for the combination of the pieces and collect the pieces of the IS design to form program specifications at a functional level and to specify program algorithms, he explained.

Some such conceptual scheme is needed, Sherr said, as the start of the process that may culminate in the use of structured programming techniques. Structuring of programs begins with "downward refining" of just such nonprocedural specifications until, at the final, lowest level, each statement about the program is in fact a primitive in the implementing programming language.

Differing Expectations

Each person involved with a developing system has different expectations depending on his or her role, and the nature of the problem as perceived from these perspectives is what accounts for many communications problems, Sherr thought.

The user defines the IS refinements clearly enough in his view, Sherr explained, but in reality he is just stating the corresponding communications system of the organization that wants to use the IS under development.

The designer explicitly describes the IS modules he intends to have developed and prescribes the construction of those modules to preserve the integrity of the solution as he sees it.

The implementor constructs the IS reliably and accurately in accordance with his understanding of the designer's requirements in order to deliver the system to the user.

The likelihood that these three views will become more and more diverse as they mature means, Sherr emphasized, that a capture of the description of the system in an automated way is vital to the success of the project. This capture process must start, he added, with the storing of the user table of organization, the roles the people involved play and the flow of work through the structure.

Disarming Modesty

If Sherr himself had had such an understanding of who should check various aspects of a project, he added by way of illustration, he would never have gone through the agony of converting a Burroughs-based Cobol banking system, developed in Pennsylvania, to run on IBM 360/370 gear in California.

With a disarming lack of modesty, Sherr said he was able to handle the technical aspects of recoding ("at considerably higher costs of time and money than originally expected") but was stopped cold when the client's legal staff said the system couldn't be used as planned.

California banking laws simply would not permit the concept of branch office control that was inherent in the original design of the system, whereas Pennsylvania law found it acceptable.

Sherr admitted that much of what he proposed had been put forth by others earlier, but only as separate fragments of the scheme he had put together as a conscious synthesis of what had gone before.

As unrefined as it might be, the IS specifications standards approach might serve, he hoped, as a first step toward a formal definition of computer programming.

Assembly Language: Popular but 'Inefficient'

By Nancy French
Of the CW Staff

SAN DIEGO – "We don't code in octal any more, so why use Assembly language?" David Dahm, a consultant, asked an audience of ACM members here.

One of the ideas posed in a session devoted to the "unpopular and unacceptable" in the world of computing, he said it makes sense not to use Assembler because "higher level languages are far superior, easier to use and more efficient.

"People don't want to give up Assembler because they understand it so well," he explained, but nevertheless, "Assembly language is obsolete and has been for 10 years.

"If your compiler can't handle coding in a higher level language, change your compiler," he shot back in response to an objection raised by an attendee who said he needed the tight step-by-step control provided by Assembler.

Dahm's view was supported by Forrest Carhart, manager, programming languages and applications, Burroughs Corp., who admonished attendees to eliminate machine-dependent languages for their operations.

"We're working toward eliminating all references that hint of hardware architecture," he said.

"At burroughs we can do this, because the people who design the systems do the programming," he explained.

"The point is," Dahm said, "given two different programmers, writing the same program, sometimes you are more efficient in Assembly language and sometimes in a higher level language."

Citing experiments he performed, higher level languages were at least 10% more efficent than Assembler, no matter what the applicaton," he said.

Carhart urged attendees to "get more professional. We'll never become professional as long as we use Assembler. What we need is integrity and discipline in programming.

"Users should be revolting against using Assembler to achieve maximum efficiency. I think we're on a nostalgia trip," he said.

Session chairman David Bulman, U.S. Customs Service, regaled the audience with his personal list of other "unpopular" and "unacceptable" ideas:

- No programming team should ever exceed five.
- There doesn't exist a systems analyst who can't or doesn't code well.
- First-level management must read and understand all code written in their group.
- Machines without word structures.
- Interpretive hardware.
- Associative memories.
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IMS User Claims

Generalization Heightens Problem of Tuning DBMS

By Don Leavitt
Of the CW Staff

SAN DIEGO – Even though users of data base management systems (DBMS) were "irritated by the inefficiencies of the early implementations," there has been even more concern lately in improving the performance of the systems, Prof. Ben Shneiderman of Indiana University told an overflow session at ACM '74.

The problem of tuning, however, is not limited to any one system or set of systems, but arises naturally from the process of generalization itself," Hugh Hoskins of Rockwell International said later in describing his company's efforts to tune IBM's IMS.

A generalized system is bound to be somewhat less effective for any individual user than would be a specialized solution, he said, and IMS copes with the problems in four ways: It limits the scope of the solution, imposes a discipline on the user, includes self-correcting and self-adapting mechanisms and provides for human-tunable variables.

Big Is Best

IMS is a highly flexible system aimed at a broad spectrum of the DBMS marketplace. It runs best, Hoskins said, in a medium to large OS shop – "the larger the better" – where the objective is to put a large portion of the enterprise on-line.

As with most generalized DBMS, IMS trades application development costs for processing efficiency, and as a result it requires "a powerful CPU with lots of memory and scads of direct access storage" to achieve acceptable performance, he said.

Literally dozens of tuning variables exist in IMS, Hoskins noted, "and the degree to which these are optimized can make or break an IMS installation." The variables fall into two broad areas: data base administration and IMS system definition.

The data base administrator must make data base and application design decisions that trade off storage efficiency versus processing efficiency, user application performance versus total system performance and ease of implementation versus ease of maintenance versus throughput.

"There are those application designers in any organization," he said with a chuckle," who feel that the amount of system resources they can dominate is an extension of their masculinity."

The IMS system definition specialist must make decisions closely akin to those of the data base administrator. Proper load balancing of packs, arms, control units and channels, as well as selection of optimium memory dynamics pools, are all part of his responsibility.

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Proper placement of queues, indexes and system libraries, determination of which system components should be core-resident and which should be on high-speed drums or disks, and finding ways to minimize directory searching and module loading are still other aspects of the system definition that can affect performance, Hoskins said.

Necessary Resources

In order to accomplish a successful tuning program, an IMS installation requires the following resources, he continued: proper organization with defined responsibility, authority and management backing, IMS, quantitative analysis and system programming skills; and good records and documentation.

Other resources required are "a functioning change control system" and software and hardware tools for measuring the impact of tuning efforts on system performance.

The result of a successful tuning program could be reductions in hardware costs, better throughput, better planning and control or change and good user relations, "something a number of IMS shops do not have," he said.

Tools from IBM to support tuning efforts "could not have been designed more poorly if they had been designed to be no help at all," Hoskins added in answer to a question from the floor. He noted that the data communications monitor used became an integral part of the system nucleus and included no real data reduction software.

"The report put out by this monitor is just about as long as a printout of the entire log tape for the period being monitored. And that's not much help. I want something that will let me scan a reasonable sized report and say everything's OK or there's the problem."

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Proposal to Reduce Math Requirement In Curriculum '68 Meets Opposition

SAN DIEGO – The idea that some computer science majors are taking more math courses than they need, based on ACM's Curriculum '68, was sharply disputed at an ACM '74 meeting here last week.

The session featured a report of the Curriculum Committee, which recommended modifying the "core" or minimum requirements in mathematics prescribed by Curriculum '68. The move would ease the burden on students whose interest lay in business data processing rather than earning degrees in the more esoteric applications of computer science, panelists said.

Among the panel's suggestions were reducing basic math requirements to "some" set theory, elementary linear algebra, a "little" calculus and probability and statistics.

According to Donald Loveland of Duke University, subject areas such as discrete structure could be "blended into other computer science courses" rather than studying them for a whole semester.

"Linear algebra, the elements of matrix theory and probability and statistics," deemed necessary by Curriculum '68 are "not even pressed by the big name computer science schools," Loveland explained.

Critics Converge

Those who disagreed with Loveland's view didn't hesitate to speak out, however.

"In a field that is changing as fast as computer science, how can we equip a student to do well at his first job with no thought to the job he'll face 10 years from now?" one listener asked.

Another said, "What do you do with the student who has taken the minimum requirements who then decided to continue studying his master's degree in computer science?"

Still another warned, "We have to be careful with minimums. People may grab onto them and be misled into believing that's really all they need."

In defending the committee's position, Loveland pointed out that the recommendations concerned only the "core" requirements, not a recommended program. "I'll still continue to recommend many more courses for my own students," he said.

Lending some perspective to the committee's recommendations, Gerald Engel of the Virginia Institute of Marine Science, suggested that the flaws were not necessarily in Curriculum '68 but rather in how it was implemented in many places.

Although the major dispute concerned mathematics requirements, attendees recommended other modifications such as increasing student exposure to hardware architecture, as well as emphasizing the growing interface between and "interchangeability" of hardware and software solutions.

With regard to the difficulties experienced by community college students matriculating to four-year computer science programs, one listener suggested that rather than reducing the number of math courses, schools "rearrange" where they fall in the curriculum so transfer students don't lose a lot of time making up these requirements.

The changes in math requirments were the only recommendations the Curriculum Committee made following its July meeting in which Curriculum '68 was studied in its entirety.

Matching Money

STANFORD, Calif. – Computerized matchmaking has advanced from the dating game to the field of academics at Stanford University. Here, a computer system has the task of matching research interests with funding sources.

The Stanford Computerized Researchers Information Profile Technique (Script) has two purposes: it constantly informs faculty of new funding opportunities in areas where they have an interest and informs potential research sponsors of individuals who are interested in a certain field.

Design-Phase Testing Could Improve Program Quality

By Don Leavitt
Of the CW Staff

SAN DIEGO – Despite a trend toward standardized, problem-oriented and structured programming languages, Barry De Roze, program quality director for Vitrolabs, told an ACM '74 session on testing business systems he saw "no cause for great optimism" for application programs in the immediate future.

To change that situation, he said, users must develop and stick with a scheme of verification and validation of software which, as its major feature, includes testing considerations in the earliest parts of the design phase.

User programs should probably also include built-in testing aids, he added.

An independent testing team is almost an absolute prerequisite for such an approach, DeRoze noted, and this team should check out both the executive and application areas of any system being tested.

Traditional Versus 'Global'

There are two distinct schools of thought on testing, DeRoze said. The traditional approach allows unconstrained development processes and then applies extensive verification validity testing to assess the quality of the output. It tries to test many logic paths and to establish good confidence levels, "but it has no built-in feedback to the design phase."

The "global" approach, by contrast, imposes a rather specific structure all through the design and development cycle, to encourage the generation of high-quality code from the beginning. As the system moves along, the tester – "true, it's not testing in the conventional sense" – concentrates on areas of the specifications or coding that appear to have the best potential for improvement.

The global approach works from a position of anticipation rather than reaction to problems. No matter how well-tested a system is, residual errors still exist in the coding, he explained, but the smart programmer will have some idea of what may go wrong and how serious it can be before it happens.

In the global approach, the testing process actually encompasses three separate if overlapping areas, he said.

"Verification" deals with actual computer code and covers conventional debugging methodology.

"Qualification" assumes successful completion of the verification phase and attempts to answer the question, "Does the code and the system design adequately solve the pertinent problem?" Finally, "certification" is the pseudo-legal phase that might otherwise be called acceptance testing, before the system becomes operational, he said.

Because they deal with botb coding and design specifications, though from somewhat different viewpoints, qualification and certification are sometimes grouped under the single term "validity," DeRoze explained. Even though forcing the programmer or analyst to consider the test environment early in the design of a system – "instead of being a catch as catch can operation after everyone's all through with it" – may make him seem less productive, it should in fact eliminate many problems that perhaps couldn't be adequately handled, he added.

Conventional verification procedures apply to any language, essentially to see that the code assembles or compiles correctly, that the processor assigns legal addresses and that the object program executes "trivial" test cases as expected. While it insures that the code is self-consistent, it does not insure that it is correct, DeRoze stressed.

If done correctly, qualification should demonstrate the subject program's conformance with its operations requirements. It should also identify and evaluate potential failure points and the effect of any failure that might occur at those points.

CW
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Top-Down Programming

Responding to a question of how to anticipate the "disasters" that sometimes occur when "good" modules are brought together at integration test time, both DeRoze and fellow panelist Jerry L. Ogdin of Software Techniques, Inc. spoke out strongly for top-down programming.

Ogdin agreed also that "much more effort is needed at the front end," including an honest evaluation of whether the user specification as given can be implemented. "There's no use trying to force them if they just won't go."

Once the specifications are set, "top-down design and programming can be done, though it is tough to get programmers to change their habits," he said. Outside pressure to do things a new way may be abrasive, but good results can be obtained if a competitive spirit is built up between the programmers and the test team, Ogdin added.

The question of end-user participation in the development cycle received nearly unanimous answers from the panel. The user should be welcomed during specification development and for the evaluation of the final test results. But no one wanted the user "under foot" when intermediate tests "with obviously poor results likely" were being studied.

Bus Schedules Go Awry in N.J.

WALL, N.J. – Outdated information from the township and bugs in the state's computer program combined to wreak havoc with busing schedules here when schools reopened in September.

The result: computer-designated bus stops too far from home, in some instances a distance of a mile or more; several students who reside less than a mile from school were assigned stops located a mile or two in the opposite direction; students were advised to await buses 2,000 and 3,500 feet from railroad tracks which no longer exist; and kindergarteners scheduled for afternoon classes received morning bus routes, a spokesman for the township's Board of Education commented.

Approximately 3,600 bus passes, stipulating the time and location of pickups, were prepared for students by the state Division of Pupil Services Transportation Information Planning Services (Trips) program.

With up-to-date information, the right controls and a full-time data processor acquired just three-months ago, the township should be able to purify the input, he remarked.

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But Doctors Have Reservations

'Patient Power' Increases With Diagnostic Systems

By Edith Holmes
Of the CW Staff

BOSTON – Without ignoring the issues of privacy and confidentiality, several physicians speaking at a recent conference here indicated they see the computer as a medium for getting "patient power" into the diagnostic and therapeutic process.

By using an interactive system to interview people to obtain their medical histories, Warner Slack, a physician and associate professor of medicine at a local hospital, told the Conference on the Legal Aspects of Computer Use in Medicine his patients feel they are in charge during the interview.

"Patients generally prefer the computer to a doctor as an interviewer because, for the first time, they are in control. Within the framework of the questions, patients can dictate the course of the interview," Slack said.

The computer can be programmed both to enable the system to explain a question to a patient if he or she doesn't understand it and to provide a "none of your damn business" or "skip it" option should a patient wish to keep some particular information private, he added.

Slack noted that by using a computer physicians could more easily allow their patients full editing privileges in regard to their charts.

While medical interviewing by computer would save physicians time and money and help to standardize the legibility, completeness and retrieval of records, Slack indicated potential legal problems are involved. For example, who would be responsible if the computer program asked a question incorrectly or omitted an important piece of information? he asked.

CW Photo by E. Holmes

Warner Slack

"Most projects in medical interviewing are still in the research stage, and we have no quantitative evidence as yet to prove the computer as interviewer is helpful to a patient," Slack remarked.

Similarly, Dr. Howard L. Bleich, associate in medicine at a Boston hospital and associate professor of medicine at Harvard Medical School, indicated more evaluation will be needed before it is possible to determine whether the computer is an effective diagnostic assistant.

In use for only a few years, computer programs designed to help physicians make disgnostic decisions are apparently less successful than billing applications in doctors' offices, Bleich said.

He recognized, however, an increasing need to develop diagnostic systems "as the constant need to keep up conflicts more and more with the needs of patients."

An associate professor of surgery and a computer engineer at the University of Alabama, Dr. Louis C. Shepard, uses a computer system to monitor and direct the infusion of blood to patients in the eight-bed cardiac intensive care unit at the university's medical center.

Like Slack, Shepard contended his system has had a definite impact on patient care but conceded he can't show this effect quantitatively.

But when his IBM 1800 wasn't in use for a short period of time, he noted, an Arthur D. Little Co. study showed the time nurses spent taking measurements tripled, the time spent charting this information doubled, one-third as much time was spent interpreting these measurements and patients received only one-third as much attention.

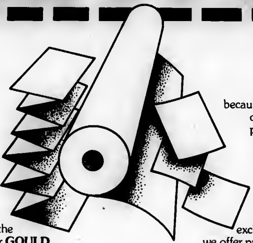
Based on this study, Slack estimated that without the computer system the unit would require twice as many beds and three times as many nurses.

Some Questions

While he conceded medical computers hold the potential for improving health care delivery, G. Otto Barnett, M.D., director of the laboratory of computer sciences and associate physician at a Boston hospital and associate professor of medicine at Harvard Medical School, noted a number of problems have been encountered in present medical applications of computers. He posed a variety of questions, including:

- How can information generated by a computer be authenticated when that system can't accept the classical means of authorizing a document, the signature?
- What standards of comparison are available for evaluating the performance of a computer system?
- What standards should define the availability of information and how long can information be retained on-line?
- How accurately does the precise chronology of medical events have to be recorded by the computer when a variety of medical personnel have access and are adding information to patient files?

"I have no sympathy for those in medicine or law or DP who think these machines can do everything," Barnett said. "Choices must be made in order to stike a balance between the availability, the accuracy and the confidentiality of information, given the requirement of being cost-effective."



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Few Legal Handicaps Seen in Health Care Systems

By Edith Holmes
Of the CW Staff

BOSTON – No significant or insurmountable legal handicaps or barriers exist in the use of computer systems for medically acceptable applications, an attorney told a national conference on the legal aspects of computer use in health care delivery here recently.

But legal factors should be considered, along with technical and medical elements, when designing and implementing automated systems, Roy N. Freed, author and lecturer on the legal aspects of computer use at Boston Unversity Law School, cautioned the audience of 80 physicians, hospital administrators, lawyers and data processors.

Jointly sponsored by the American Society of Law and Medicine, Inc. and Blue Shield of Massachusetts, Inc., the conference went beyond the familiar legal problems of privacy and confidentiality to treat contracting for computer systems, the liability involved in creating and using computerized health-care systems and the duty of physicians and hospitals to use automation to improve health care delivery.

Freed noted that while the actual impacts of most rules of law depend largely on the circumstances involved in particular cases, some existing rules could actually require the adoption of computerized health-care systems. "Legal rules adopted in the future might also require the use of such systems," he added.

Given the availability, economy and proven performance of systems and software, Freed predicted many automated diagnostic systems will become elements of "due care." Computerized monitoring of patients and closed-loop systems used in therapeutic procedures will eventually be required, he said.

Freed further suggested "computerized medical records will be used increasingly as sources of information for review and other supervisory functions."

Product Liability

But while physicians and hospitals may become obligated by law to use computer systems in a variety of applications to meet certain, established standards of care, the professional and tort liability exposure of physicians and of hospitals, respectively, could be reduced, according to Freed. He also anticipated an increased product liability on the part of suppliers of computer systems and software programs for health care delivery.

"As in many other areas, suppliers of computer systems and software programs might be particular legal targets" due to changing liability measurements and exposures, he remarked.

Particularly with regard to liability, however, "many legal rules are frustratingly general and difficult to apply with any degree of certainty," Freed commented. "Little, if any, resolution of relevant legal questions involved in health care delivery systems has been experienced."

He pointed to contracts for the acquisition of computer systems and programs as still another area where legal questions abound. "Considerable innovation will be required in characterizing the transactions and properties involved here," he said. Properly constructed contracts could "anticipate adverse legal impacts and forestall them."

CW Photos by E. Holmes

Roy Freed

Because computer technology "is extremely dynamic," Freed stressed that the assessment of legal considerations "must be continuous."

He called on various professionals "to recognize their respective interrelated roles and to work together."

National Insurance To Be Supreme 'Test' Of DP Privacy Issue

BOSTON – National Health insurance will be the "biggest test" of the "computer privacy" issue in medicine to date, a computer industry official warned a recent meeting of physicians, lawyers and DP personnel here.

Speaking before the Conference on the Legal Aspects of Computer Use in Medicine, Robert P. Henderson, vice-president of Honeywell's North American Computer Operations, said whether national health insurance eventually covers dentists, psychiatrists or get-well cards, it "cannot operate without the medical computer."

Henderson

"The medical computer is the only instrument we have that is able to cope with the complex administrative functions and massive data requirements of a health plan covering more than 200 million people," he explained.

But, Henderson added, national health insurance administered via computer systems will have to be carefully handled "to protect the confidentiality of the doctor-patient relationship."

While warning that "unrestricted encroachment" of the computer into medical recordkeeping could destroy personal and professional privacy, he also characterized the machine as "an oft-indicated nonconspirator. By its very nature, the computer is incapable of robbing a bank or burglarizing a doctor's office."

"But, admittedly," Henderson continued, " it has been used to commit such crimes. Our task is to make it impossible for the real criminals to operate."

Calling for the development of a high level of security to protect computer data banks established to administer the national insurance or any other health plan, Henderson charged computer manufacturers, government agencies and the medical community with the responsibility for providing the necessary safeguards.

He pointed out a number of security techniques available to computer users. These include coded user-ID cards, special transmission signals and "rings of protection" to keep sensitive information from the probes of unauthorized users.

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Editorials

Theory Just Not Enough

University education is woefully inadequate to prepare students for the real world of business data processing, a fact that was eloquently articulated by Afips' president, George Gleser, at the recent Educom conference [CW, Nov. 6].

But Glaser in some ways missed the mark by placing most of the blame on computer science departments in large and small universities. The educational failure is not so much the fault of just the computer science department but of the entire university.

We need trained computer scientists as they are being produced today for the theoretical side of computing: to accomplish the basic research in computer science and to lay the groundwork for future advances in systems over the next few decades.

On the other hand, however, we also need people trained in applying the present technology to the business environment.

This second group should *not* be trained in computer science per se but rather should receive the body of their training in the more traditional business and accounting areas with a heavy minor in computer appreciation and the basics of computer science.

Computer use is becoming more applications-oriented all the time and, in many – if not all – cases, understanding of the applications area is more important to effective completion of an installation than is "computer science."

Many of the problems in the past with implementation have been caused by computer scientists supplying solutions to the wrong problems because they had little or no understanding of the environment of the business.

This can only be overcome by getting computer science out of the computer science departments alone and introducing it in a wide range of university departments that are more oriented toward the real world – if that is really possible in the university environment.

A Stronger Commitment

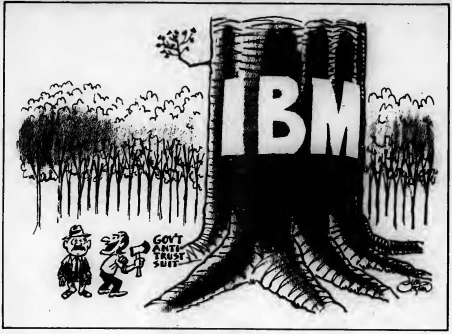
With this issue, we have begun labeling reader-submitted opinions "Reader Commentary" instead of "Viewpoint" as in the past.

While the move is in many ways cosmetic, it does reemphasize our commitment to serve as a forum for all of our readers' opinions, whether they agree or disagree with our editorial policies.

We feel it is our duty and responsibility to air the opinions of all in the computer community and are taking this opportunity to invite all readers to correspond with the other members of that community through us.

As in the past, short contributions – under 150 words – will usually be treated as Letters to the Editor while longer material will be used in the commentary section.

So if there's something you feel strongly about – concerning the use of computers or the "profession" – be it technical, political or social – write it down. We welcome all comments.



'Matches or Toothpicks?'

Letters to the Editor

Privacy Legislation Unavoidable; Let's Hope for the Right Kind

The theme of the editorial, "Will We Be Forced to Accept Mandated Privacy Controls?" [CW, Oct. 23], depends, as you say, upon this trade we indulge in becoming "professional."

I am of the opinion that the variously styled friendly societies which we are wont to call "computer societies" have no hope of ever being more than toothless advisers. I think that the specter of legislation cannot be avoided – my own hope is that the right sort gets enacted.

Let me illustrate:

"Computer Society XYZ, Inc.", hereinafter called XYZ, Inc., has a scheme by which people can be assessed and graded for admission to that august body.

Let us assume that Mr. ABC has reached the pinnacle of his vocation and has been made a Fellow of XYZ, Inc. Now, something happens and doubts develop about Mr. ABC. What is XYZ, Inc. going to do?

If XYZ, Inc. casts out Mr. ABC, what protection does it have against being sued destitute by Mr. ABC? Answer: If Mr. ABC can prove damage to his prospects (whatever that may mean), nothing.

And if XYZ, Inc. successfully casts out Mr. ABC, what recourse has Mr. ABC against an employer or customer who tries to unload him as well? Answer: If Mr. ABC can prove that nothing substantial which in any way violates any agreement or contract has been proven, everything.

The only way to stop Mr. ABC "getting his own back" is for governments to provide legislation which creates a statutory body to which the task of measuring DP professionalism is given.

This body would have power to prescribe a syllabus and the examinations to go with it, the rules of conduct (code of ethics, if you prefer), the power to proscribe certain jobs to "unqualified" persons and the power to admonish and "deregister" members of the society or union.

Once such a system is set into operation, I think that matters such as the operation, safety, security, correctness, etc. of DP installations will be more easily controlled since lack of the prescribed safeguards can result in action against the people responsible. Furthermore, what constitutes "prescribed safeguards" can be left to the statutory body.

Lester James Devaney
Wellington, New Zealand

Capabilities of PL/I Show Fortran Not Necessarily Better

I am certain R.A. Baker [CW, Oct. 30] did not obtain his information from the PL/I Optimizing Compiler manual.

For one thing, based vaiables can be passed as parameters and for another you can READ into parameters. As for not being able to read in a variable format, both Cobol and PL/I do not have a need for this since the data can be read in and then various structures "overlaid" upon the data to "pick it apart."

Concerning the comment about statement numbers/labels, in the structured programs we have written we have had very little need for them, and besides the mnemonic labels in PL/I are more meaningful than the statement numbers in Fortran.

Furthermore, I do not find the Optimizing Compiler encourages sloppy programming. On the contrary, it encourages more standardization through its increased error-checking at compile time and the program-formatting capability of the Checkout Compiler.

This is not intended to be an outright blast at Fortran; I like the language, but PL/I as it exists is a significantly better language than Fortran VI or Fortran X would ever be.

James P. Holtman
Greensboro, N.C.

A Mule With Painted Stripes Does Not a Zebra Make...

D.G. Bauman's letter on the pros and cons of the Certificate of Data Processing [CW, Oct. 30] appears to be a very rational and commonsensical comparison of the two points of view. I happen to support Bauman and Fred Twepesta in this approach to the emotional area of "professionalism."

Sometimes we forget that even though we paint black and white stripes on a mule, we do not have a zebra. On the other hand, a mule and zebra can be trained to perform the same task in a similar manner, but the animals have not been basically changed.

G.L. Hammon
Austin, Texas

Expect Less Speed With VS

Donna Pyle's findings regarding VS as reported in *Computerworld* Oct. 16 just don't measure up.

It isn't reasonable to expect CPU cycle time to speed up just because you've switched from OS to VS on the same hardware. In fact, considering system overhead, execution time should increase.

By analogy, given the same recipe and temperature, a blast furnace couldn't bake a cake any faster than a conventional home-style cooking range. Naturally, the overhead would go up a little.

But if the economies and efficiencies attendant to the increased capacity were to be considered . . . but then Pyle probably doesn't bake cakes either.

Marvin C. Cruzan
Kansas City, Mo.

(Other letters and reader commentaries on Pages 13, 14 and 16.)

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One a Coercive Monopoly

Damning AT&T and IBM in One Breath a Mistake

By Joe Wright

Special to Computerworld

Although both IBM and AT&T are certainly dominant in their respective industries, they cannot properly be lumped together for equal damnation as argued by A.G.W. Biddle, executive director of the Computer Industry Association, at the recent National Retail Merchants conference [CW, Nov. 6].

The crucial difference between IBM and AT&T is that the latter is a coercive monopoly while the former is not. A coercive monopoly is a monopoly that can prohibit competition. Competition can be prohibited only by the government and it is only through the power of government that AT&T is shielded from competition.

IBM has no such power and has earned its market position through free trade on a free market (to the extent that the market has been free). It has numerous competitors whose actions provide restraints on IBM's pricing and incentives to technological progress. Several of these (or combinations of these, if it weren't for antitrust laws) could seriously cut into IBM's market by offering superior products and services at lower prices.

The fact that IBM has maintained its market position in the face of diverse competition from frequently lower-priced offerings is proof that the majority of the users have thought over many, many years that IBM is the best deal in town, everything considered, and polls of users confirm this.

And here, let's not be fooled by Biddle's bull about users being "locked in" to IBM or about IBM's tremendous, overwhelmingly irresistible marketing power. Any user can toss IBM out on its ear at any time – contract or no contract – if IBM defaults on its commitments. Of course such an action may prove extremely costly – but so would it with any other vendor.

Reader Commentary

And as for IBM's "oppressive" marketing tactics, I submit that, more often than not, they are cited to cover up and excuse user weakness and apathy. IBM cannot force its way into anyone's shop – and if you don't want IBM salesmen coming around, simply tell them to stay the hell out!

Such is not the case, however, with AT&T. It is an authentic coercive monopoly that only recently has been subject to (very limited) competition and only because of a loosening of the regulatory prohibitions of the Federal Communications Commission. Unlike IBM's users, AT&T users are indeed locked in, if they are to have communications services at all.

Until recently they have had no alternatives. And right now they have only a few. Why? Because of government-granted monopoly power.

The result of this arrangement has, of course, been (1) an incredible lack of innovation and technological progress, (2) a decline in quality of service, (3) erratic and seemingly unjustified price increases and (4) bizarre pricing and service policies (for example, charging $7,000 to $8,000 to install a device that may subsequently rent for a couple of dollars a month or charging $100 or more for a special colored plastic housing on a common telephone or having to "engineer" the installation of a simple on-off switch).

Repeal Laws

The AT&T monopoly can be busted up by repealing the laws that created it. Anyone who can come up with the financial, technological and managerial wherewithal should be free to offer communications equipment and services – including AT&T, who should not be penalized and handicapped by new government regulations.

In communications, in data processing, in all industries the market should be opened up. Trade should be freed of *all* government regulations so that production can increase, so that innovation will be spurred, so that choices will be widened and so that prices will come down.

Wright is assistant manager of North American Reservations and Communications at Icelandic Airlines, Inc.

'And Now We'll Hear From the Opposition . . .

Hardware Costs to Crash

Mic-Squared Systems Will Be the Challengers of FS

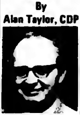
"Microcomputer "is a descriptive but fairly long term. If you add to it another qualifier that is just as long, it becomes a mouthful. And if that qualifier is "microprogrammed," the result is simply verbally indigestible.

Yet "microprogrammed microcomputers" is what this column is about, and both parts are important, so the name Mic^2 systems will have to do. These appear to be the real challengers for commercial computing dollars in the years ahead – challenging the IBM Future Systems (FS) themselves.

The Taylor Report

By

Alan Taylor, CDP



The challenge is put out most specifically in a book published by General Automation, Inc. called "The Value of Micro Power." The relevant part says:

". . . The grossly inflated prices that the established computer manufacturers charge for their medium- and large-scale computers are propped up by the massive number of computer programs that have been developed for these machines since 1960. So huge would be the cost of reproducing these programs on cheaper computers that in any replacement situation it would be uneconomical to take a computer with a different instruction set, even if it were free. But microcomputers change all that. We are already close to the day when expensive medium- and large-scale computers can be functionally reproduced by cheap minicomputers. At that time the problem of reprogramming expense will disappear since existing programs will run without modification on the new microcomputers."

You can't get much more specific than that without announcing a product, and neither General Automation nor anyone else has announced such a product as yet.

The development of microcomputers during the past decade, and particularly in the past two years as the technology went from a computer-on-a-chip to the modern computer cards, is not something at which we can sneeze. Nor can its sales volume, now approaching the 10,000/mo figure, be ignored.

But can it really be done? Is there any other reason to suspect that the claims may be at least half-way right?

FS Questions

I think there is, and I think the reason concerns one of the problems now being raised for FS as the concepts behind these suggested replacements for the System 370s become better known. Last month, for instance, the *Wall Street Journal* discussed whether the computer market was ready for the systems.

The meeting minutes of IBM's management and management review committees give no reassurance that the computer market will be ready to accept the FS concepts. Indeed, the basis for the inauguration of the FS systems design was *not* the attractiveness of the FS systems but the weaknesses of the 370s and the fear that IBM would be unable to prolong their life until the 1976-1977 era.

This fear apparently made it imperative that the replacements should be revolutionary, not evolutionary. IBM knew in 1970 that it had to jump ahead in the 1975-1978 era. Ahead, apparently, of the market.

The idea of IBM being ahead of the market is an unfamiliar one. Since the development of the 305 Ramac over a decade ago, IBM has consistently been waiting until the market was ripe and the techniques were thoroughly understood before marketing anything. Its operating systems of 1965 came five years after the Burroughs, Honeywell and Ferranti operating systems. Its virtual memory came a decade after Burroughs had virtual. Only in one area has IBM really pioneered technically, and that was in 1965-66 with the use of microprogrammed emulation of earlier computers – that is, exactly in the one area that General Automation has now singled out as the way to bring the hardware costs of future FS competitors crashing down.

So the type of threat now posed is one which IBM engineers would have no trouble understanding. It was indeed the basis of their own success in fighting off Control Data and Honeywell 10 years ago.

Safeguards Also Seen

Moreover, there is a distinct weakness in the Mic^2 argument that, as soon as a user brings his programs to a suitable system, he can run them on it.

Users nowadays no longer own their own programs completely. They may own at best some RPG or Cobol source language, but the Cobol source is by no means hardware-independent.

The same major computer manufacturers whose products the Mic^2 may challenge each have their own proprietary and subtly different Cobol compilers, so the Mic^2 systems would have to emulate the individual compilers as well as the machines.

And users of application programs today are normally licensees of the same major computer manufacturers. Their licenses are restricted ones which don't let them walk away with the programs at all!

(Curiously enough, the practice of licensing application programs came in 1969 – just as the decision to go ahead with FS was given. It *could* be coincidence, but on the other hand it does provide a good protection against the same threats now posed by the Mic^2 development, so that could also have been part of the design.)

So there you have it. This is the challenger that is now emerging. For those who are interested in the physical realities behind all this I would recommend reading "The Value of Micro Power" and its companion, "The Value of Power," both published by General Automation, 1055 South East St., Anaheim, Calif. 92805.

They are good background reading for all who like to see where the future is coming from, as well as how the present works.

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UPI Photo

Earlier this month MIT's chairman of the board, Dr. Howard Johnson (right), watched as Nasa administrator Dr. James Fletcher (left) presented President Gerald R. Ford with a space-grown crystal. Nasa said really minute computers someday may come from space crystal factories, so don't expect computer evolution to stop with this year's technologies. (See story for one development that's nearly here.)

Like to get a completely objective view of the IDMS database management system from actual users?

Datamation: September, '74 issue. Article by Mr. Huhn describes actual use of IDMS in handling the major business data processing of a large chemical company. Reprint available. Use coupon below.

DATAPRO 70: October, '74 issue. This newest review of IDMS by DATAPRO not only outlines the structure and general features of IDMS, but also includes interviews with seven IDMS users. Reprint available. Use coupon below.

EDP-Analyzer: October, '74 issue. Entire issue devoted to CODASYL-like Database Management Systems, including systems offered by UNIVAC, Xerox, DEC and Cullinane Corporation. Sorry, no free reprints. But you can purchase from Canning Publications.

The three current magazine articles shown above discuss IDMS in a realistic fashion, reflecting the viewpoint of users who've had enough actual experience with the system to give a valid opinion.

To balance off all of this outside objectivity, we also have our own brand-new 30-page technical brochure which includes all the latest enhancements. We think it is also about as factual and non-promotional as a company brochure can get.

Reprints of two articles (the EDP-Analyzer issue must be ordered from the publisher) and the new brochure are yours free, simply by filling out our coupon. We'll also be giving a limited series of IDMS seminars in Cleveland, New York and San Francisco, prior to the Spring Computer Caravan seminars. Our coupon will bring you complete details.

We won't try to give you a salestalk on IDMS in this ad—except to say that a lot of organizations are buying IDMS despite the obvious competition of other systems including IBM's.

But when you think about it, that alone is quite a selling statement, isn't it?

Technical Brochure, just published by Cullinane Corporation, is exactly what we say it is: technical and factual, not promotional. Also includes a list of users. Use coupon below.

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Associative Processor Not Cost-Effective For Proposed Uses

By M.J. Viehman

Special to Computerworld

Large associative processors (AP) such as Goodyear's Staran, far from being pioneer innovations, are probably the most conspicuous existing waste of computing power. These machines can be shown ineffectual at the jobs which they are supposed to solve: air traffic control, information retrieval, etc.

The question here is not whether a problem can be solved in a particular manner or whether a system can be constructed to perform as an AP; both of these things are known. The question relating to reason for existence is use – economy. Are large APs cost-effective in light of present knowledge of problems, machines and construction of solutions?

The answer is no and a base inductive proof is given in nonmathematical terms. In many problems of air traffic control,

Reader Commentary

information retrieval, statistical processing and pattern recognition center on what can be loosely called the correlation problem: finding coordinates close to a given track, finding the bit pattern "close to" the retrieval value, cluster or pattern.

What happens in an AP that is large enough to hold all the active tracks, data base, etc. is that each bit of the search argument is compared (in parallel) with each bit in the data base. Now from information theory and practical considerations, after the first several of these comparisons, most of the comparisons need proceed no further – i.e., the search has failed on these items. For any reasonable system this has to be the case; if not, you can't discriminate between the aircraft under the systems responsibility, the data matches all (or most) of the data base or other such nonconclusive conclusions.

The question is why we put all that circuitry to work to find answers that are already known. Isn't it more cost-effective to think more about the problems? The answer is yes.

Suppose we rearrange the same or less circuitry to maintain and search an "ordered" data base. Essentially what the processor will do is what an operator observing a display of the data would do: only query items close to the interesting values.

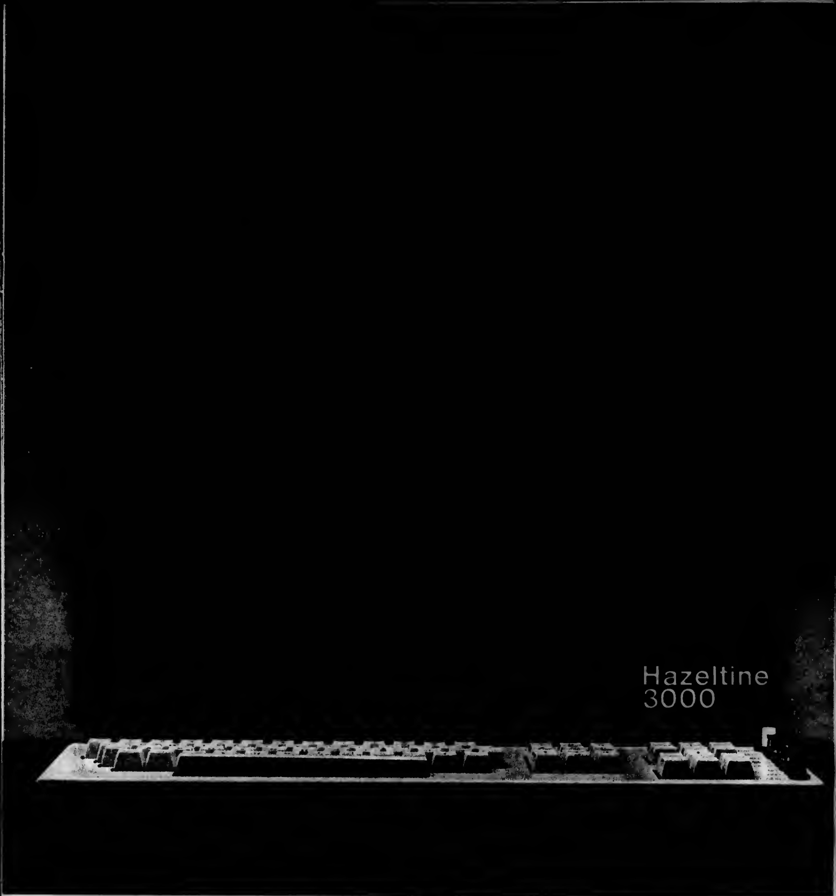
Applying these techniques reduces problems seeming to require on the order N^2 operations to solutions requiring order log N operations. Since APs grow according to N, it should be possible to do the same job in the same time with only a processor of order log N.

Viehman is a senior engineer at Tetra Tech, Inc.

EASYTRIEVE

"If they took EASYTRIEVE out of this place we would probably fold".

PANSOPHIC SYSTEMS, INC.



YOU'LL CALL IT FANTASTIC!

The Hazeltine 3000 terminal has a programmable microprocessor-based communications interface that makes it compatible with communications disciplines of most computer manufacturers. It has the features that make communicating so much easier—powerful local editing capability, protected formatting with dual-intensity video, full-size 1998-character display, uncluttered moveable keyboard, and a full range of options. It's a "custom" terminal at an "off-the-shelf" price: $125 per month (12-month rental, maintenance included)...and it's backed by worldwide sales, service and technical support from the Company with a half-century of leadership in electronics and displays! Fantastic!

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. . . and others - limited only by your imagination

Johnson Systems provides the most widely used and comprehensive computer utilization reporting system in the industry.

And there are a multitude of good reasons why.

We did not try to "second-guess" your installation's reporting requirements. The system features a flexible report generator which allows you to design your own utilization reports. We also provide a set of control cards defining a host of standard reports to complement your repertoire of custom-made reports.

Our OS version accepts the SMF. data base provided by MFT, MVT, VS1, and VS2 operating systems. In addition, the report generator can simultaneously accept our standard DOS data base.

A DOS-only version collects computer utilization data available via the job accounting option in the supervisor. The report generator subsequently processes this data according to user specifications. Accounting data available from GRASP and ASAP spooling systems can be processed too.

The system has been designed to maximize ease of operation. It's so simple – people use it.

We could go on and on about the advantages of our system and the things it can help you accomplish. Write or call us today, and we'll be pleased to send you more information about our product.

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Letters to the Editor

Misrepresentation in Ads Real Culprit of 'Layla'

The ECI Software Corp. Layla ad, in all probability, was offensive to many people, particularly those who feel persecuted or rejected in our current crush to stamp out discrimination in a thousand areas.

I feel compassion for Julie Wilson [CW, Sept. 11] and Paula Berg [CW, Oct. 16], but sincerely feel that gross misrepresentation of facts in advertising is the real culprit and that the "eye-catchers" are a result of frustrated advertising people.

When the advertisement agencies quit trying to insult the intelligence of their readers, perhaps eye-catchers won't be needed.

Douglas Steiner
Grand Junction, Colo.

She Was Offended Even in Retrospect...

I have been reading the letters about the Layla ad. Even though I am the president of the local National Association for Women chapter as well as a faithful reader of *Computerworld* I have never noticed the original ad. However, upon reading the first two letters, I looked it up in the library and concluded it was indeed an offensive ad.

It does my heart good to see the Louis Mills letter [CW, Nov. 6] because he seems to be as much repelled by sexually suggestive advertising as I (and probably many other women and men) am. I hope that CW can edit out any future contributions or ads of this type.

Sally F. Dennis
T.J. Watson Research Lab
Yorktown Heights, N.Y.

...And So Was He

Please add my name to the growing list of those offended by the sexism of the Layla ad. I am only sorry I didn't write sooner.

Daniel D. McCracken
Ossining, N.Y.

Naive User Deserved It

In regard to Glenn W. Graham's article "Installing MRP: How to Do a One-Year Job in Six," I had to laugh at his predicament. His situation is so typical of first-time users who are too stupid to do the obvious.

These users should pay a responsible DP manager to come in and explain at the beginning what it took Graham six years to find out. He deserved exactly what he got.

Mickey V. Anderson
Alexandria, Va.

SYMBUG-C
Interactive COBOL Symbolic Debugging System

SYMBUG-F
Interactive FORTRAN Symbolic Debugging System

SYMBUG-A
Interactive ASSEMBLER Symbolic Debugging System

VM/370 ISAM
CMS Simulation of OS ISAM

VM/370
SOFTWARE 'SUPERIOR BY DESIGN'

VSORT
Integrated CMS Sort System

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Conversion of EXEC Files to Assembler Code

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CMS File Compression

CMS DEBE
File Utility for CMS

STANDARD DATA CORPORATION 1540 Broadway, New York, N.Y. 10036 212/586-3100

Random Notes

System 2000 Report Writer Extended to CDC Equipment

AUSTIN, Texas – A new version of the report writer feature for data management System 2000 from MRI Systems Corp. provides installations with Control Data Corp.'s 6000, Cyber 70 or Cyber 170 CPUs (running under Scope, Kronos or NOS) a nonprocedural means of generating user-formatted reports.

The CDC report writer module is available for $15,000. The basic System 2000 costs $30,000, MRI said.

MRI is at P.O. Box 9968, 78766.

PDP-11 Programs Cross-Assembled

WOODLAND HILLS, Calif. – The X-11 cross-assembler from Compata, Inc. permits Digital Equipment Corp. (DEC) PDP-11 programs to be assembled on "any" host computer that supports an ANS Fortran compiler with 24-bit or larger integers.

A macro library and card image input produce an output listing in Macro-11 format and a binary file suitable for input to Link-11, DEC's linkage editor. X-11 is available for a one-time charge of $3,500 from Compata, 6150 Canoga Ave., 91364.

'County' Computes Land Parcels

COLUMBUS, Ohio – Compu-Serv Network, Inc. has installed a property management program that computes the area of real estate parcels and generates one or more plots of each parcel on an automatic graphics system.

The program, named County, was developed primarily for governmental officials to check deeds and update county tax maps. It is available in remote time-sharing and batch processing modes on Compu-Serv's Decsystem-10s.

Input to the program consists of bearings and distances obtained from deed descriptions or survey data. The bearings may include any number of reference points and any number and combination of straight and curved boundary lines.

Multicolor output can be obtained on a variety of materials, including Mylar, from the firm's California Computer Products, Inc. Model 7000 graphics system. The system includes an automatic drafting unit that operates at speeds up to 42 in./sec with "extremely high accuracy," Compu-Serv said.

The network is based at 5000 Arlington Circle Blvd., 43220.

Clarification

The Univation system of work measurement and control now available on the Acts Computer Corp. network, headquartered in Southfield, Mich., [CW, Sept. 25], runs on a remote job entry basis to IBM 370/155s.

IBM In-House System

CMIS Controls Multiplant Manufacturing

By Don Leavitt
Of the CW Staff

BOSTON – Though some effort has gone into developing the financial application portions of management information systems for manufacturing companies, very little work has yet been done in the manufacturing areas themselves.

There are exceptions, however, and at the recent Nerem 74, P.F. Bacigalupo of IBM's Waltham, Mass., facilities described his company's development and implementation of what is called a "common manufacturing information system" (CMIS) for its own internal use.

CMIS was conceived in the late 1960s as a means of supporting the growing interdependence among IBM's North American data processing plants.

A terminal-based system which uses standard format data bases at each location, CMIS is generally an operations management system and not, he stressed, a top management system.

"To be effective, CMIS must be independent of organizational boundaries," Bacigalupo added. Noting repeatedly that the ideas behind CMIS could be used by any manufacturer, he explained that the system addresses three major functions: operations planning (requirements generation), material logistics and manufacturing management information.

CMIS provides real-time response to inquiries and batch reporting. As a communications vehicle, it provides multiple locations within a plant with a single data base of information. Although each plant has its own DP capability, there is a "manufacturing central" operation in the IBM scheme, the planner continued.

Much effort was devoted to standardizing data file formats, data element names, size and definitions. This approach was also applied to application programs and the choice of hardware.

The scope of CMIS provides for the exploding of the product schedule into a materials plan, controlling the release of orders for purchasing and manufacturing and controlling the stocking of resultant parts and subassemblies. The cycle of issuing subunits to the manufacturing floor and stocking the ever larger subassemblies continues through the final assembly process of building machines according to customer orders, he said.

The nine subsystems defined in CMIS were assigned to specific plant sites for development responsibility. The approach was to have a centralized systems design team, he said, with program coding and testing done at the separate plant sites.

Plants would then implement the subsystems on a staggered basis. But, he added, the actual history of system development in the project brought about organizational as well as implementation changes.

Two plants were picked to implement all the subsystems and that brought about a rescheduling of the entire project. "As with any complex project, much can be – and in this case was – learned from initial problems."

Justification for CMIS, as for any project, lies in both tangible and intangible benefits, Bacigalupo told his audience. Just about two-thirds of the tangible benefits were expected to come from improved inventory control and better management of information systems manpower. Cutbacks in user personnel needs, reductions of purchasing costs and miscellaneous savings from less scrap and lower communications costs were expected as other tangible benefits, he said.

MMS Ledger Update Supports Account-Oriented S/3 Data Base

ANDOVER, Mass. – Installations with 24K or larger IBM System/3s have the opportunity to impose control over allocation of expenditures and budgets and to extract both fixed and special reports with a new version of the MMS General Ledger system from Software International.

Originally developed for IBM 360/370 users, the system allows both financial and statistical data to be stored, modified and retrieved from an account-oriented data base.

Each account in the user's ledger system has a record in the base. Each record includes an account number with as many as 24 digits, an account type indicator and the balance currently in the account.

In addition, there are as many as 13 periods of actual experience for both the current and the previous year for comparative studies, the account total budget for the current year and the spread of that total into as many as 13 periods for comparison to "actuals."

The system provides users with flexibility in designing their charts of accounts, the company said. Account relationships are defined and their hierarchies can be modified by the user, without depending on an imposed renumbering of accounts to show new logical groupings.

The relationship file permits users to maintain different charts for various subsidiaries and still be able to summarize dollar values or statistical figures up through an unlimited number of levels, the vendor said.

The program is written in ANS Cobol but supplied only in object code "to discourage users from tinkering with it." It requires Release 11 or later of System/3 control software to function properly, the spokesman said.

The rental fee is $250/mo on a four-year lease plan, plus an installation fee of $1,500, the company noted from Elm Square, 01810.

Subroutine Package Enhances Nova's Computational Features

SOUTHBORO, Mass. – Double-word arithmetic and double-word format conversions are among features available to Fortran programmers working on Nova minicomputers with the Commercial Subroutine Package (CSP) just released by Data General.

Character field adjustments and real-time multiterminal support are also part of CSP. That range of computational and formatting capabilities makes the package particularly useful in formatting reports and data messages in instrumentation and control, computational and data communications applications, a spokesman said.

CSP expands the capabilities of Data General's Fortran IV and Fortran 5 processors while providing support for inputting, editing and outputting of data arrays in formatted or unformatted manner.

The subroutines are compatible with all the functions of Data General's Real-Time Disk Operating System (RDOS).

The package is set up as a library of callable subroutines so the user may select only those that are needed. The calling sequences, said to have error validation similar to other Fortran library routines, allow manipulation and conversion of data entered from terminals, cards and paper tape, as well as files stored on fixed- or moving-head disks, magnetic tapes or cassettes.

Editing of character strings into structured output includes insertion of dollar signs and suppression of leading zeroes, the spokesman said.

CSP is available now without cost to Data General Fortran users. It can run on any Data General computer with a minimum of 16K bytes of main memory.

MMS General Ledger makes 1974 Datapro Honor Roll! Datapro Research Corporation's second annual survey of proprietary software users picked the *best* software packages. Only 20 packages made the honor roll. Only *three* were applications systems . . . including MMS General Ledger.

We know we have one of the best Corporate Financial Reporting Systems available. Our more than 150 happy users around the world know it, too.

So get a good thing going for your company. MMS General Ledger. It's unusually flexible because of unique data-base design. And operates under DOS, O/S, IDMS, IMS, or even TOTAL.

We're very proud to have made Datapro's 1974 honor roll. We'll be honored to have you as a user.

Congratulations! Please tell me more about your Corporate Financial Reporting Systems.

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Sysgen Made Simple--Part 2

'P' Macro Links Source, Job Statements

By Robert T. Alexander,
James M. Blackford and Fred Schuff
Special to Computerworld

In the first article of this series, the authors outlined the basic steps in an operating system generation and the parameters they utilize to simplify the SYSGEN procedure. In this article they provide details on the macros and other coding techniques used to implement these basic concepts.

Concepts and Techniques

The "SYSGEN Made Simple" procedure required several user written macros (P, SETP and PEDIT). The most important was the "P" macro which allowed the one-for-one correlation of assembler language source statement to job stream statement.

The format for coding the P macro statement is as follows:

bPb' ......1-71 text characters ....'[,X]

This would require a statement of up to 78 characters. Setting the value ICTL 1,80 for the assembler allows full access to the entire 80 columns of the source statement records. (The optional parameter (,X) denotes that continuation is to be indicated in column 72 of the generated record which is written to SYSPUNCH.)

The "P" macro acts as a front end to the PUNCH statement. For each execution of a "P" macro statement, a PUNCH statement is constructed and executed.

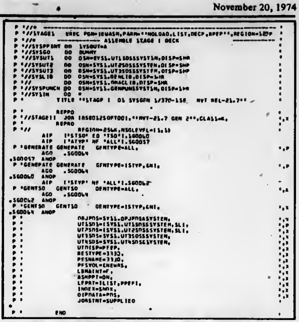
The normal processing of the assembler handles the substitution of values for symbolic parameters, generation of a single quote where two appear, and generation of a single ampersand where two appear. Therefore, the text within the literal must be processed to align the continuation character in column 72 of the output records (SETP macro).

This creates standard records of JCL and assembler source statements. The generated output records contain a supplied user deck identifier in columns 73-76 and an internally generated sequence number in columns 77-80.

Looking at a sample of the SYSGEN master deck in "P" macro format illustrates the facilities this procedure provides (Figure 1).

Prior attempts to use the facilities of conditional assembly have been made within the STAGE-1 source deck but this method required that when choices were made, there had to be multiple copies of each complete macro with the entire set of parameter values coded in each separate copy. Using the "P" macro facility allows for the construction of the STAGE-1 macro statements by

(Continued on Page 19)



```
P '//*  -----------------------------------------------------------  '
P '//STAGE1   EXEC PGM=IEUASM,PARM=''NOLOAD,LIST,DECK,RPEP'',REGION=120P '
P '//*  -------------  ASSEMBLE STAGE I DECK               ----------  '
P '//SYSPRINT DD   SYSOUT=A                                           '
P '//SYSGO    DD   DUMMY                                              '
P '//SYSUT1   DD   DSN=SYS1.UT1SDS$SYSTIN,DISP=SHR                    '
P '//SYSUT2   DD   DSN=SYS1.UT2SDS$SYSTEN,DISP=SHR                    '
P '//SYSUT3   DD   DSN=SYS1.UT3SDS$SYSTEM,DISP=SHR                    '
P '//SYSLIB   DD   DSN=SYS1.GENLIB,DISP=SHR                           '
P '//         DD   DSN=SYS1.MACLIB,DISP=SHR                           '
P '//SYSPUNCH DD   DSN=SYS1.GENPUN$SYSTIN,DISP=SHR                    '
P '//SYSIN    DD   *                                                  '
P '          TITLE ''STAGE I  OS SYSGEN S/370-158   MVT REL-21.7''    '

P '          REPRO                                                    '
P '//STAGE11  JOB  (ASE012SOFT001,''MVT-21.7 GEN 2''),CLASS=K,         ',X
P '          REPRO                                                    '
P '//                 REGION=256K,MSGLEVEL=(1,1)                      '
         AIF   ('&STSO' EQ 'TSO').SG0060
         AIF   ('&STYP' NE 'ALL').SG0057
P 'GENERATE GENERATE   GENTYPE=ALL,                                   ',P
         AGO   .SG0064
.SG0057  ANOP
P 'GENERATE GENERATE   GENTYPE=&STYP,&N1,                             ',P
         AGO   .SG0064
.SG0060  ANOP
         AIF   ('&STYP' NE 'ALL').SG0062
P 'GENTSO   GENTSO     GENTYPE=ALL,                                   ',A
         AGO   .SG0064
.SG0062  ANOP
P 'GENTSO   GENTSO     GENTYPE=&STYP,&N1,                             ',X
.SG0064  ANOP
P '                    OBJPDS=SYS1.OBJPDS&SYSTEM,                     ',X
P '                    UT1SDS=(SYS1.UT1SDS&SYSTEM,SL1),               ',P
P '                    UT2SDS=(SYS1.UT2SDS&SYSTEM,SL1),               ',X
P '                    UT3SDS=SYS1.UT3SDS&SYSTEM,                     ',X
P '                    UT4SDS=SYS1.UT4SDS&SYSTEM,                     ',X
P '                    UTDISP=KEEP,                                   ',X
P '                    RESTYPE=3330,                                  ',X
P '                    RESNAME=3330,                                  ',X
P '                    RESVOL=&NEWRS,                                 ',X
P '                    LBMAINT=F,                                     ',X
P '                    ASMPRT=ON,                                     ',X
P '                    LEPRT=(LIST,XREF),                             ',X
P '                    INDEX=&NDX,                                    ',X
P '                    OIPDATA=PDS,                                   ',X
P '                    JOBSTMT=SUPPLIED                               '

P '          END                                                      '
```

Figure 1. SYSGEN Master Deck in "P" Macro Format

'Frend' Reconciles On-Line Data Batches

NEW ROCHELLE, N.Y. – On-line capture and reconciliation of batched data coming into an IBM 360 or 370 from 30 or more video terminals is the design goal of Frend, a package from Quantra Development Corp. that can become, the vendor said, the front end of many application systems.

After capturing data, Frend allows it to be displayed and reconciled with adjustments to a batch header. On-line access to related master and summary files allows additions, changes and deletions, Quantra noted.

Data integrity is maintained with support for both hot core and file recovery routines, total system monitoring and a security approach oriented to the terminals rather than the mainframe, a spokesman said.

Inputs are accepted from CRT terminals, cards, magnetic tapes and disks on-line. Frend supports up to six monetary batch types within one partition or region, and any number of detail transaction types within each batch type. Two levels of reconciliation are available, he added.

Currently, the system can support up to 500,000 details, about 40,000 batches and 10,000 cash letters daily. Since each batch and cash letter must be assigned a unique identifier, total on-line control and selective pageable displays of all batches and cash letters are provided, the vendor claimed.

Disk space for storage of the batches is managed by Frend's queuing function. Since edits and prompting formats are table driven, CRT screen displays may be easily changed to suit new requirements, Quantra added.

At the end of each day's operations, a shutdown function is available to verify that everything that should be done has, in fact, been done. Various monetary summaries and proofs may be run at any time during the day, or after shutdown, to record what has been captured to that point.

Frend can be used under DOS or OS or in an IBM Customer Information Control System (CICS) environment. It is available under license for $50,000.

Installation time varies from one to three months depending on the application, Quantra said from 15 Whitfield Terrace, 10801.

INCOTERM® CORPORATION

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'P' Macro Provides Correlation Of Source, Job Statements

(Continued from Page 18)

individual values or groups of values.

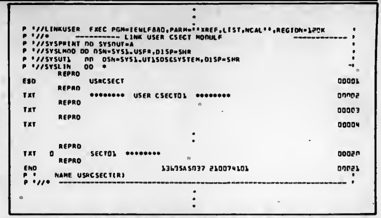
The one problem encountered was the necessity of duplicating a full 80-character record from the job stream. These records were IEBUPDTE (or IEBUPDAT) data records for modification of released code on the DLIB01 volume or when object decks ("hex" decks) were to be included. This problem was handled via the assembler language REPRO statement followed by the full 80-character record (Figure 2).

Once the master deck was created, the mechanics for generation of the complete job stream for performing a SYSGEN were greatly simplified. To create the job stream, a control deck with the JCL to execute the assembler and the setting of the values for the standard parameter set consisted of about 30 cards. The assembly generates a job stream of about 4,000 records.

A major factor in the size of the generated job stream was the creation of JCL for jobs to submit one or more job steps of the STAGE-II job stream as a separate job for execution. This section of the job stream was created with another special macro, the "PEDIT" macro, which creates JCL to extract the desired step (or steps) from the STAGE-II job stream data set (via IEBEDIT) and creates the necessary JCL to submit the job (via OS or HASP).

In our case, we chose to select each job step as a separate job for keeping track of output and queuing the jobs sequentially for execution.

The most significant obstacle encountered in creating the procedure and master decks was the collection of the complete job streams. The initial preparation was very time-consuming (as is the initial installation of any of the components that went into the master decks). To reduce the effort required, a special utility program was created to convert a standard job stream record to a "P" macro format record.



```
                                     .
                                     .
                                     .
P '//LINKUSER  FXEC PGM=IEWLF880,PARM=''XREF,LIST,NCAL'',REGION=120K      '
P '//*       ---------- LINK USER CSECT MODULF                 ---------- '
P '//SYSPRINT DD SYSOUT=A                                                 '
P '//SYSLMOD DD DSN=SYS1.USFR,DISP=SHR                                    '
P '//SYSUT1   DD  DSN=SYS1.UT1SOS6SYSTEM,DISP=SHR                         '
P '//SYSLIN   DD  *                                                       '
       REPRO
ESD            USRCSECT                                              00001
       REPRO
TXT            ********  USER CSECT01  ********                      00002
       REPRO
TXT                                                                  00003
       REPRO
TXT                                                                  00004
                                     .
                                     .
       REPRO
TXT   0        SECT01  ********                                      00020
       REPRO
END                              1363SA5037 210074101                00021
P '    NAME USRCSECT(R)                                                   '
P '//* ------------------------------------------------------------------ '
                                     .
                                     .
                                     .
```

Figure 2. The problem of duplicating a full 80-character record from the job stream was handled via the assembler REPRO statement followed by the full 80-character record.

To update the master decks, standard job streams were processed through this utility, and then the "P" format statements were updated into the master decks. Minor maintenance or modification to the master deck(s) could be handled by creating the actual "P" macro format cards directly.

The role of a proprietary library package and more details of user coding required to make SYSGEN an easier procedure will be covered in the next part of this series.

The authors worked together at the National Bank of Detroit and Alexander is still in the systems group there. Blackford is with Xerox Corp., Rochester, N.Y., and Schuff is now with Coastal States Gas Corp., Houston, Texas.

Comserv System 'Does' Processing Of Order Entry Data

MINNEAPOLIS – Terminal-oriented processing of the entire order entry system ties back to a small-scale IBM 360/370 mainframe for users of the Distribution Order Entry System (Does) now available from Comserv Corp.

Functions supported by the system include entry and editing of basic order information, invoicing, handling of inventory information and accounts receivables – including account aging and sales analysis. Remote inquiries for credit information and similar immediate needs are also within the scope of Does, the vendor said.

The use of cassette-based terminals appears to be vital to the system. Keying order information onto the cassettes for later burst-mode transmission to the mainframe, and receiving processed data from the central CPU at high speed on cassette for later slow printing, were both cited by Comserv as the expected way to use the package.

Once received at the mainframe, the data is edited line by line for validity.

At the end of each batch of input, Does transmits whatever error messages are appropriate so items can be corrected for reentry with the next batch entry. Voluminous reports and documents can be directed to a high-speed line printer at user option, Comserv stressed, acknowledging the print units with most terminals might be inadequate for some users.

Does can be integrated into Comserv's previously available CAS III financial reporting system, the vendor said, and indications are that linkups could be made to other financial systems as well.

The system is written in Assembler and Cobol for use on a 360/370 with a minimum 32K bytes of main storage, two disks and three tape drives. It functions under DOS release 26, OS Release 21 or the Customer Information Control System (CICS).

Does is available under license for a one-time fee of $18,000 or $600/mo for three years from Comserv at 3050 Metro Drive, 55420.

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At the other end, INCOTERM ties into the Illinois LEADS system in Springfield, to access the state's fast-growing criminal data bank...about crimes, about vehicles, about stolen property, about guns.

Through INCOTERM, the officer on the street can also communicate with law enforcement agencies in surrounding states—Wisconsin, Ohio, Indiana, Kentucky—over the high-speed lines of the new ALECS system. And INCOTERM also ties him into the NCIC system of the FBI.

Even if a suspect is seated in the cruiser beside the officer when the return message comes in, INCOTERM screens the information in the station house first to permit the encoding of data critical to the officer's safety.

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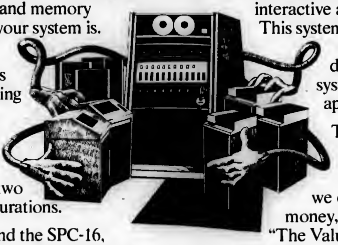

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Bell Defines, Proposes Tariff on Isals

By Ronald A. Frank
Of the CW Staff

ALBANY, N.Y. – Users in New York with certain phone lines that access a CPU may soon have to pay a special monthly rate if a Bell tariff proposal is approved.

The New York Telephone Co. has proposed that data lines be classified as Information System Access Lines (Isal) if they are behind a PBX and are used to access a CPU.

According to the proposal, Isal charges would apply to "dial private branch exchange, Centrex and centralized switching service lines connected acoustically, inductively or electrically to automated subscriber-provided information systems."

The Isal fee would be $15/mo per line but a user would be required to pay a flat yearly rate of $180, the proposal stipulates. It is estimated that about 47 New York Bell customers are currently being charged under special assembly agreements for about 1,000 phone lines.

Unresolved Issues

The tariff proposal states that acoustically coupled lines would be classified as Isal lines, but it is not clear whether a user would have to pay the extra charges if an acoustically coupled terminal were used part of the time and voice calls were also made from the same phone.

Since the Isal lines are on the user's premises behind the PBX, it also is not clear how it would be determined that a CPU were being accessed or what would happen if an acoustically coupled terminal were moved from line to line as customer usage changed. The tariff proposal includes a statement that an Isal line "may be terminated in a telephone, data set, or data access arrangement." But there is a question whether customers with noncarrier PBX equipment would have to pay the proposed charges, especially if the rate is based on the amount of Bell switching equipment installed at a user location.

Another question to be resolved is whether the Isal charge will be applied to both ends of a line used to access a CPU. Also, since the tariff proposal mentions subscriber-provided information systems, there is some question whether a user with Bell Dataspeed 40 CRT terminals would have to pay the additional charge.

It is believed that Bell will claim PBX extension lines or Centrex lines used to access a CPU will require more equipment than if the same lines were used for voice conversations. Bell's rates for PBXs are usually based on the "predicted quantity of switching equipment related to the number of lines used by the customer," according to one regulatory expert, and Bell may say that more switching equipment is required for lines accessing a CPU.

User Opposition

The phone company originally filed the tariff proposal on Sept. 5 to take effect on Nov. 5, but it was suspended by the New York Public Service Commission (PSC) until March 4, 1975. The PSC reportedly had raised the issue and asked the phone company to propose a tariff because the Isal rate had been applied under special assembly arrangements to an estimated 47 intrastate users.

Special assembly rates are contracts that are meant to apply only for a limited period and the PSC had asked for a tariff because some Isal customers had been billed for four years under the "temporary" arrangement.

The Isal proposals are not new. They were first raised by Bell companies in Ohio, California, and a number of other states only to be rejected by the various state regulatory commissions. A major factor in these rejections was opposition from user groups such as the Associstion of Data Processing Service Organizations (Adapso) and time-sharing companies.

Among the users that have indicated a tentative desire to take part in upcoming proceedings on the Isal proposal are a number of New York state agencies including the Office of General Services, the State University at Buffalo, Binghamton and Albany computing centers, the Department of Transportation and others.

In addition, commercial firms using CPUs within New York have expressed an interest in the proposal. One of the largest of these is IBM and a spokesman said, "We plan to attend [the hearings] but haven't yet decided what action to take, if any." It is also believed the Adapso is studying the New York Telephone Co. proposal.

DAA Rates Down

ALBANY, N.Y. – The recent New York decision which said users can install a Data Access Arrangement (DAA) without having a telephone [CW, Nov. 6] also included reduced DAA charges.

Under the new rates the CDT will cost $1.94/mo, down from the present $2.46; the CBS unit will cost $4.65, down from $6.00; the CBT will be priced at $3.19 instead of the current $4.00; and the CBV power supply will cost $1.15 instead of the present $1.85.

As part of its decision, the N.Y. Public Service Commission said New York Telephone must file the lower rates "no later than Nov. 18, 1974."

Much of the testimony in the case was presented by the Independent Data Communications Manufacturers Association and the decision is expected to set a precedent for similar proceedings related to the DAA which are pending before the Federal Communications Commission.

Comten Adds 3650 Front End, Communications Net Software

ST. PAUL, Minn. – Comten, Inc. has added an IBM 3704-type programmable front end called the 3650 and has also introduced its Communications Network System (CNS) software.

The 3650's controller can terminate up to 64 lines in any combination of synchronous and asynchronous modes and can support a "sustained data throughput rate of 30,000 char./sec," the company said.

The 3650 can support "all standard IBM terminals" and some non-IBM terminals and the unit has a maximum main storage of 256K bytes with a cycle time of 650 nsec. The front end can operate with both IBM 360 and 370 CPUs and is compatible with the IBM 370X emulation or NCP modes, requiring no changes in host application or teleprocessing software.

Two IBM host CPUs can be simultaneously supported by the 3650 which allows for dynamic network reconfiguration through commands initiated either from the 3650 console or from associated terminals. The front end can be configured as a remote communications concentrator or as a front end.

The 3650 price ranges from $45,000 to $150,000 or from $900/mo to $3,000/mo on a two-year lease.

New Network Software

Comten also unveiled its CNS software which supports both the 3650 and the earlier, larger 3670 which is comparable to the IBM 3705. CNS can operate in either NCP PEP mode or emulation mode, thus improving on the more limited capabilities offered by IBM's new System Network Architecture, a Comten spokesman said.

IBM's SNA is limited to 370 native mode NCP on the IBM 370X, he said.

The CNS software can support application programs not operational under Tcam or Vtam and it can operate with both 360 and 370 CPUs. Additionally, the software can handle two major IBM software systems concurrently.

CNS is available without cost to users of the 3650 or 3670 front ends from the company at 1950 West County Rd., 55113.

The Model 40: Did It Deliver on Its Promises?

By Dr. Alan K. Jennings
Special to Computerworld

It has been over a year since Teletype Corp. announced its Model 40 terminal. From the sketchy details first released, it appeared that the advantages of independent TTY-replacement CRTs had disappeared.

The full Model 40 details are out now; a few machines have even been delivered. The Model 40 is not designed, nor apparently was it intended, to be a direct replacement for the Model 35.

Although both are asynchronous devices, the Model 40 is much faster, operating at a transmission speed of 120 char./sec. In fact, a Teletype 4210 magnetic tape terminal is required for the Model 40 to efficiently communicate with the Model 35 or 33.

Analysis

The features of the Model 40 make it comparable to dozens of nonprogrammable CRT terminals, but it still falls far short of matching the features offered by internally programmable terminals. The Model 40 is basically transmission-compatible with existing communications software for medium-speed asynchronous Ascii terminals.

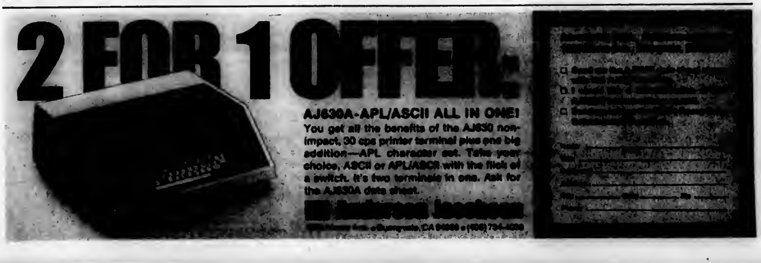
It does offer special features but with a major drawback: the special capabilities almost invariably require user modifications of existing software. Still, when compared on a feature and price basis, the Model 40 appears similar to many of the so-called superteletype CRT terminals.

Technological Advances

The Model 40 is indeed technologically advanced compared with earlier teletypes; it uses a high quality 7 by 9 dot matrix and an MOS refresh memory, provides strong editing features and has been carefully engineered for operator convenience. Its 5-1/4-in. by 11-1/4-in. viewing area is among the largest in the field, and the tube can be tilted to enable each operator to adjust the display viewing angle for maximum clarity.

A total of 1,920 characters (24 lines)

(Continued on Page 23)



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We test our 1236 disk packs to standards much tighter than those of the leading equipment supplier. If anything unpleasant should happen, we'd much prefer it happen here than on your drive. As a regular procedure, we do scratch tests to check coating thickness, impact tests to determine head crash resistance, detergent tests to check resistance to wear and temperature variations, and drop tests to make sure balance and alignment don't shift during shipment. We test to make sure our 1236 disk packs are error free.

Finally

Our 1236 costs no more than other twelve-high disk packs. You're already paying for BASF quality . . . you might as well have it. For more information on the 1236 or other BASF disk packs or cartridges, write to BASF Systems, Crosby Drive, Bedford, Massachusetts 01730.

You're already paying for BASF quality, you might as well have it.

Did Teletype Corp.'s Model 40 Deliver on Promises It Made?

(Continued from Page 21)

can be displayed at any one time, and the Model 40 has an interesting operational feature in its scrolling memory. In addition to the basic 24-line data display, this option permits storing another 24 or 48 lines of data in the terminal without having to go to an auxiliary storage device.

This stored data is divided into three 24-line segments, and any consecutive 24 lines can be displayed at one time. By depressing the scrolling keys, the operator can move data up or down one line at a time. By depressing the segment advance key, the operator can go forward 24 lines at a time.

Particularly with this option, the Model 40 allows convenient preparation and editing of text. It has seven cursor control keys and five editing control keys for data manipulation prior to transmission. Moreover, with the highlighting option, the Model 40 has the capability of field blinking, thereby calling attention to particular segments of data.

Limitations

Clearly, the Model 40 has some outstanding features – which makes its limitations all the more significant. First, of course, is the relatively slow transmission speed of 1,200 bit/sec. While this is an increase of an order of magnitude over the Model 35, it is still quite slow. CRT communications terminals today commonly operate at speeds up to 4,800 bit/sec and some can operate at 9,600.

Second, and even more significant, the Model 40 is not programmable, a deficiency that greatly limits its flexibility. This deficiency may be attributable directly to the court injunction which restricts Teletype from marketing computer equipment.

The lack of a microprocessor limits the Model 40. For example, its transmission technique is asychronous only, a limiting capability compared with the best of the CRT terminals. Some of these are capable of operating synchronously, asynchronously or directly with a specific computer. Again, all that is usually required is the appropriate read only memory (ROM) and the appropriate one of two or three hardware adapters.

Another example of the flexibility afforded by use of a microprocessor and ROM control memory is evident in the keyboard capabilities. The Model 40 has a fixed-design keyboard, keyboard layout, function keys and editing and control keys are all fixed in the original design.

By contrast, some CRTs provide a number of keys whose functions are determined by user-specified programming. To give even greater flexibility, the keyboard layout and the control and editing key functions can be modified by changing the ROM control program.

Other features are also given up because Teletype didn't use a microprocessor. For example, the flexibility of ROMs offers a variable I/O capability. Serial or line printers, flexible disks, cassettes and magnetic tape drives can be tied in, and the terminal can communicate with them at any time.

All this adds up to very limited flexibility. In effect, a user must design his system specifically for the Model 40, altering his software and sometimes his interface hardware. Clearly, this is a serious drawback.

Another explanation for this inflexible configuration is the fact that, for some time at least, the Model 40 was primarily intended for the use of AT&T. Hence, adaptability to various computer systems was not a primary design goal. If Teletype can hurdle the regulatory barriers, this problem can be solved in adding microcomputer circuitry and memory, effectively making the Model 40 a simple stand-alone computer with sufficient flexibility.

Such an approach would be expensive to the user, of course, increasing the price of the Model 40 substantially, but it would explain the strange packaging of the machine which presently requires a separate controller module mounting 10 plug-in boards which contain all the logic.

This approach is completely at odds with the self-contained, compact packaging used by most programmable CRT terminals and is quite inconvenient for the user. Either he must buy a bulky pedestal mount, with the controller in the pedestal, or he must locate the controller on a table adjacent to the Visual Display Unit. Particularly if the user buys the printer as well, this configuration results in quite a large space utilization.

Jennings is manager of advanced products for Pertec Corp.

'The Plug' Compatible With IBM 3277 Display

NEW YORK – An information display terminal has been designed by Genesis One Computer Corp. to be plug-compatible with the IBM 3277 Model 2 display station.

Built to coexist with or to replace existing 3277 Model 2 terminals for data entry and retrieval applications, The Plug, or G77, can be connected directly to the IBM 3271 or 3277 Model 2 control unit, according to the firm.

Incorporating all standard 3277 Model 2 characteristics, the G77 also features a home key to return the cursor to the first character entry position, automatic variable initialization for bright dot display of variable data, a repeat key and a blinking cursor.

The company claimed that at $3,392, the price of the G77 is approximately 20% below comparable IBM units.

The terminal can also be leased from the firm at 300 E. 44th St., 10017, for $89/mo for two years, $77/mo for three years or $73/mo for four years.

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Trans-Canada 'Datapac' Net to Combine Digital, Packet Switched Transmission

By Ronald A. Frank
Of the CW Staff

OTTAWA, Ont. – The Computer Communications Group of the Trans-Canada Telephone System has announced that its intelligent packet switching network will be operational in mid-1976.

To be called Datapac, the network will combine the digital transmission capabilities of the existing Dataroute together with packet switching techniques.

Two services will be available on the network for a variety of users. The first, called Datapac 1000, will handle transaction-type communications involving short inquiries and responses such as those used with credit authorization and point-of-sale (POS) operations. The Datapac 1000 service will be designed for low-volume users.

A second service, called Datapac 1500, will be for high-volume users who will utilize a standard network protocol to transmit their data. It is expected that this service will be 10% to 50% less expensive than current systems, a spokesman estimated.

Datapac 1000 service will include asynchronous speeds of 300-, 600- and 1,200 bit/sec for terminal-to-node communications, and synchronous speeds of 2,400-, 4,800- and 9,600 bit/sec for node-to-host CPU communications. Transaction sizes up to 200 characters will be handled and the average busy hour response time is projected at "five to eight seconds."

Some typical applications for the Datapac 1000 service will be sales reports, management information, stock quotes and inventory control, and terminals to be initially supported by the service include the Amcat I from Addressograph-Multigraph and the DSC 1131 from Data Source Corp.

Although these are primarily POS terminals, they have function keys for other applications such as the maintenance of hospital patient records, the spokesman said.

'Snap' Format

Packets within the Datapac network will utilize a format called Standard Network Access Protocol (Snap) and exact specifications for this format will be announced at the end of this month, the spokesman said.

A Snap packet has framing bits at the beginning and end which tell the receiving station where the packet starts and where it stops. A second unit for communicating with the network contains the address where the packet is to be sent, link and end-to-end protocols and the class or priority of the message.

Each packet has cyclical redundancy check which will result in an error performance of less than one undetected error in every 10^{12} bits transmitted within the Datapac network, the spokesman said.

(Continued on Page 25)

Get the Message?

A message traveling through the Datapac network would be handled in the following sequence: The originating terminal, say at a bank or retail store, sends its message to an interface processor (IP) at a Datapac network node.

The IP then places the data into network-sized packets. It interleaves several incoming data streams on one high-speed synchronous line and sends its packets to its local packet switcher. The local switcher checks the accuracy of the transmission with the IP and sends the information to the appropriate packet switcher along intercity Dataroute facilities.

All messages are kept in a buffer or storage area at each point until it has been established that the information has been received accurately at the next point.

In the receiving node, the packet switcher sends the packets to another interface processor which breaks the messages into their individual packets and ships them along the final leg.

The computer receives the message, processes it and, if necessary, generates a response which reverses the route back to the originating terminal.

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'Datapac' Net to Combine Digital, Packet Techniques

(Continued from Page 24)

Intercity links will be high-speed digital circuits based on the existing Dataroute and the Network Control and Accounting Center, which will be established to oversee all aspects of network operations. It will diagnose trouble spots or potential trouble spots and take immediate action to rectify the situation, the spokesman noted.

Every element within the Datapac network will have a backup system on automatic standby ready to take over from the prime element. And the Datapac network will employ adaptive or dynamic routing to pick the best of a choice of routes for an individual packet, the spokesman said.

Four nodes in the Datapac network are scheduled to be in operation by mid-1976 including Calgary, Toronto, Ottawa and Montreal. By 1980 additional nodes will be operating in Vancouver, Edmonton, Regina, Winnipeg, Hamilton, London, Quebec City, Halifax, Saint John, St. John's and possibly other cities, the spokesman said.

The packet switching processors at each node will be programmable and they will have the capability to undertake a variety of functions such as error checking, speed conversion and adaptive routing. And the Datapac network will link "any number of users with any number of data bases or computers." Thus it will give each authorized user the possibility of wide access to many data bases.

Usage Rates

Rates for the Datapac services will be primarily based on usage, with distance described as "a secondary factor." Usage charges will be based on a "Kpacket" basis with each packet containing 32 characters. There will be additional charges for mileage from points outside the Datapac serving exchanges.

Datapac 1000 will have a monthly access charge depending on the data bases that can be accessed from a terminal. In general, the charge will decrease as the number of data bases increase, the spokesman explained. There will also be a charge of $50/mo for each line connected at a data base.

A typical usage charge for a link between Ottawa and Montreal would be $1.25/Kpacket for service between a terminal and data base under proposed rates for Datapac 1000. A similar link under the Datapac 1500 service would cost 70 cent/Kpacket with a minimum requirement of 75 originating Kpacket/mo for each line. All proposed rates would be subject to regulatory approvals.

Multipoint 'Hilo' Users Get Free Audit Service

ANN ARBOR, Mich. – DMW Telecommunications Corp. has announced a no-charge audit service to verify billing routines for users of multipoint circuits priced under ATT's high density/low density tariff. DMW performs the verification using a recently completed functional enhancement to DMW's Hilo-74 network pricing and optimization program which produces minimum cost line routings for multipoint circuits.

Mail It In

Users may submit up to five multipoint circuits for verification at no charge; audits of more than five circuits will be made by DMW for a nominal fee which depends on the size of the network. Interested users may obtain this audit service by mailing their AT&T-stipulated routings for the circuits directly to the company.

Users who provide V and H coordinates and homing point rate centers with their service requests will generally receive the verified billing routings within 10 business days after receipt of the necessary input data.

The multipoint optimization feature will become available in the Hilo-74 package on purchase or lease basis in the near future, the company said. DMW is at 2975 Hickory Lane, 48104.

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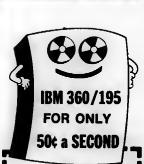

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Disk Inspector Checks IBM 3336-11-Type Packs

BURLINGTON, Mass. – A Disk Pack Inspector with expanded capability to accommodate IBM 3336-11-type packs is available from Computer-Link Corp.

The 600 Series of inspectors includes Model 650 for 2316 and 1316 packs (11 and 6 high respectively) and Model 660 for 3336 and 3336 Model 11-type packs.

The inspectors permit the checking of packs for dirt and surface scratches so they can be corrected by cleaning or removed from service before serious damage is caused by head crashes and attendant chain reactions of damaged packs, data loss and rerun.

The Model 650 is priced at $1,450 and the Model 660 at $1,995. Computer-Link is at 14 Cambridge St., 01803.

Voltage Regulator Handles 750 kVA in DP Centers

MENTOR, Ohio – A 750 kVA line voltage regulator from Cyberex can be installed either on the wall or as a free-standing floor model. The unit can be specified with: 5% harmonic filtering, spike eater transient suppression for over-voltage, step-down and isolation transformers and meters for input and output values.

The regulators are solid state and provide output voltages from 120 to 600 V ±0.5%.

A 750 kVA regulator is priced between $35,000 and $50,000 from the firm at 7171 Industrial Park Blvd., 44060.

Litton Electrostatic Printer Available in Four Column Sizes

NEW YORK – The Datalog Model MC-5000 printer from Litton Industries is said to operate from any digital source as a teleprinter and/or printer plotter.

Priced in the $6,000 to $7,000 range, standard models of the MC-5000 print at speeds up to 800 line/min.

The printer uses a 7 by 9 dot matrix for character formation, with the paper being moved 14 discrete steps to form each line of characters. Proper paper drive is "assured under a variety of adverse operating conditions," the firm said.

MC-5000 printing speeds will be available either for synchronous or asynchronous operation. Utilizing fan-fold or roll paper supply, the unit prints on various dry electrosensitive papers.

Character set is 128-character Ascii, but any code will be available on request, the company added.

Standard models come in 20-, 40-, 80- or 132-column configurations.

The company is at 850 Third Ave., 10022.

Budget-Bound User's Solution

360/30 Gets New Life With Accelerator

By Patrick Ward
Of the CW Staff

BAYSIDE, N.Y. – What does a college data processing department do with its ambitious plans when it can't get the money to replace its purchased IBM 360/30 with a bigger machine?

One answer is to make the 30 bigger and faster and use a lot of imagination in configuring it. The Queensborough Community College branch of the City University of New York (CUNY) took this approach and came up with a unique system that, while still computer-bound, can handle the batch and on-line applications the college wanted.

The 16,500-student college bought the 360/30 about six years ago as a 32K machine, said Alan W. Mason, manager of operations. Successive installations of IBM memory brought it up to 96K, the limit IBM puts on a 30's memory.

The DP staff then began looking for a 370, but New York City's policy is to purchase machines, and the college lacked the money for a new one, recalled Dr. George Goulandris, director of data processing.

"Core and speed of the CPU were the two bottlenecks we had in the 360/30," Goulandris said. "From there on it was just a simple conclusion to see . . . what we could do about expanding the core, or . . . [speeding] up the CPU, or both, which was exactly what we did."

Accelerators and Add-Ons

The college decided to enhance its 30 with both add-on memory and an accelerator device after deciding add-on memory alone would not solve the problem, Goulandris said.

Computer Hardware Consultants & Services (CHCS) of Newtown, Pa., was selected to provide an additional 96K and an accelerator. The company was the only one of the potential vendors that would make use of the 96K of IBM core, Mason said. Other companies wanted to strip the machine down to 64K before installing their own memory.

However, the college insisted on use of the full 96K, since it owed IBM $32,000 for the last 32K on a five-year plan and IBM did not want the memory back, Mason said.

CHCS installed the enhancement hardware over a weekend. The company put an additional gate into the computer, plus the accelerator and its power supply. The extra 96K is in a separate core box attached to the CPU.

The college paid $42,000 for the additional memory, accelerator, installation and warranty, Goulandris mentioned.

The college had also required that the enhancement would not force extensive reprogramming. A systems programmer had to spend only half a day changing the supervisor to allow for more core, Mason noted.

"The first week was perfect," Mason remembered. "In the case of really CPU-bound jobs, there was a 30% to 40% speed improvement the first day, which was really fantastic."

Honeymoon Over

Then hardware problems took the system down. It stayed down 70% of the time for the next three weeks, he said.

(Continued on Page 32)

Add-On Memory Modules Offered For 360/20 Users by Econocom

MEMPHIS, Tenn. – The Econ-20 memory modules now available from Econocom, Inc. complete the range of add-on memory for the IBM 360 family by providing extensions to the 360/20 as it comes from IBM.

Only submodels 1, 2, 3 and 4 of the Model 20 can utilize the additional core boxes. With them, main memories can be extended from IBM's maximum of 16K bytes up to a new high of 48K, in 8K-byte increments.

Econ-20 modules were developed and are being built for Econocom by Standard Memories, Inc. of Ft. Lauderdale, Fla., a company already marketing add-on memories for several of the larger 360 models.

The extensions for the 20 are said to operate at the same speeds as original IBM memories and to be transparent to the user except that the enhanced machine can hold larger programs.

To cope with addresses higher than the 360/20's original upper limit, Econocom had to make some slight changes in IBM's disk-processing system (DPS) control software. Otherwise, software and the diagnostics available to the user are unchanged, the vendor said.

IBM has accepted "in principle" both the new memory modules and the DPS modifications, Econocom spokesman claimed, admitting, however, that the mainframer has not yet given its blessing – and agreement to maintain modified 20s – in formal terms.

The new memory extensions, scheduled for first delivery in the first quarter of 1975, will be housed in 7-in. wide cabinets that attach to the side of the user's CPU.

Econ-20 is available in four configurations, from 8K to 32K bytes in 8K blocks, ranging in purchase price from $12,975 to $24,975. The same configurations are available under lease, with a 24-month minimum, for $475/mo to $1,045/mo.

Sorbus, Inc. has the national maintenance contract for all Standard Memories add-ons including Econ-20. Users can sign up for this service for a cost of $40/mo depending on the configuration, Econocom said from 855 Bridge Lake Blvd., P.O. Box 171116, 38117.

200 Nsec Slower

Nova 830 Cuts 840 Price by 33%

SOUTHBORO, Mass. – The Data General Corp. Nova 830 minicomputer sacrifices a little memory speed but little else to give its users a 33% lower purchase price than the Nova 840.

The 830 uses 32K byte, 1,000 nsec core memory units to make possible a system of large size and capability at lower prices, according to the vendor. The 840 memory speed is 800 nsec.

A Nova 830 processor with 128K bytes of main memory, memory management option, power supply and console panel in a 10-1/2-in. chassis with 10 additional slots available for system memory and I/O interfaces costs $23,150. An expansion chassis for additional interfaces is available.

An equivalent 840 costs $35,730, the company said.

The Nova 830 has the same facilities as the faster Nova 840: full hardware-protected dual operations, standard dual processor/shared disk operations, memory mapping with 2K-byte boundaries and support of a full 256K bytes of memory in one processor, it added.

Options available with the Nova 830 include a high-speed single/double precision floating point processor, communications adapters and process input/output devices.

The Nova 830 supports Data General's operating systems, high level languages, utility programs and program development aids.

For critical applications requiring high system availability, the Nova 830 can be configured into a dual-processor/shared disk system with a second Nova 830 or any other Data General computer, the company said.

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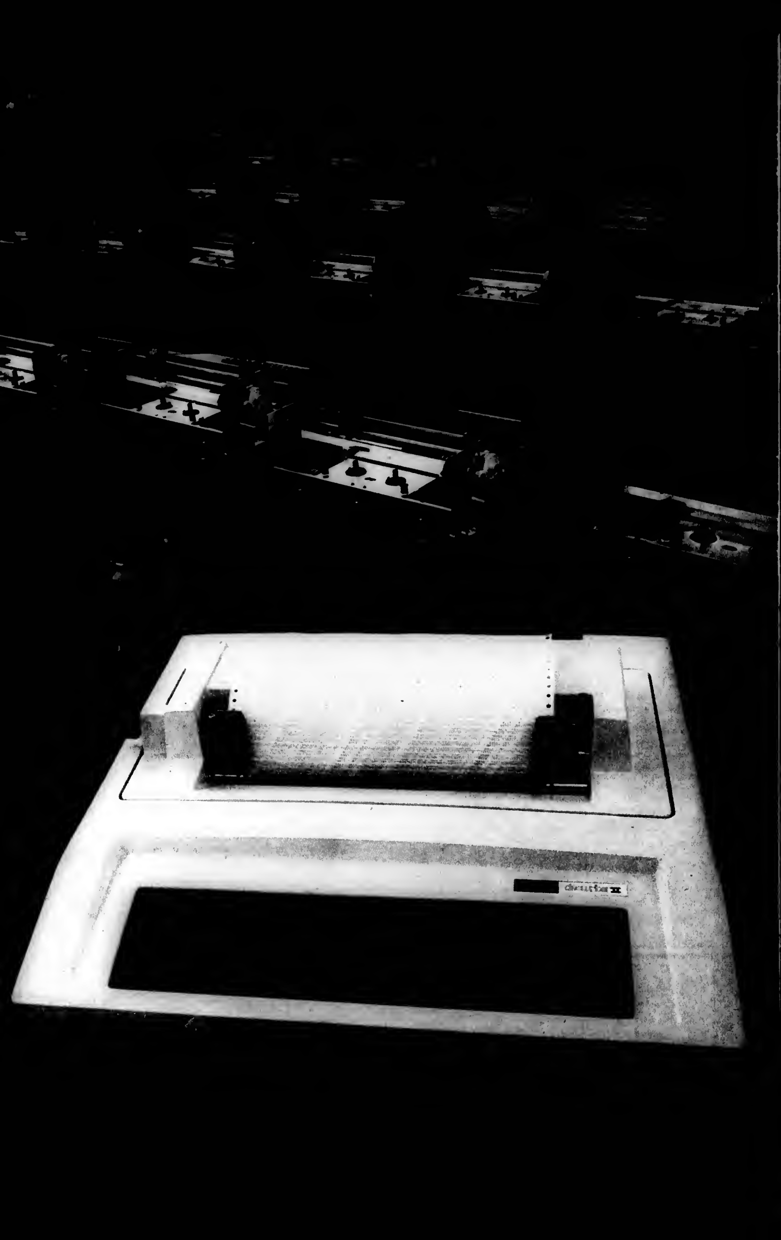

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Miniworld

Multiline Interface Designed for PDP-11

PENNSAUKEN, N.J. – Infotron Systems Corp. has introduced a multiline processor interface for Digital Equipment Corp. PDP-11 minicomputers.

The PI510 is said to be functionally equivalent to DEC's own interface, the DH-11, and is software-compatible with the PDP-11. However, it offers features that permit quick diagnosis of system malfunction and also simplifies maintenance, Infotron said.

The P1510 displays communications activity visually through LEDs on each channel adapter and central logic circuit module. Nine separate functions are monitored by the LED indicators and an audio alarm warns the operator of a central logic malfunction, Infotron added.

The PI510 can handle up to 16 channels and can transmit and receive a mix of 14 data rates from 0- to 9,600 bit/sec. Diagnostic test tapes are supplied with the system.

A typical system is priced at $10,000 from the firm at 7300 N. Crescent Blvd., 08110.

Orbis Diskette Drive Interfaced to PDP-11

COSTA MESA, Calif. – Orbis Systems, Inc. has interfaced its Model 74 diskette drives to Digital Equipment Corp. PDP-11 minicomputers.

The controller seeks on all drives independently and the seeks can occur while reading on one drive. Average record transfer rate for a four-drive system with randomly located records is 11 record/sec.

In addition to the IBM standard 26 sector/track (128 bytes each), the controller will initialize diskettes into 15-, eight-, four-, two or one sector/track.

Sector search, correction of track position for initialized bad tracks and CRC generation and check are accomplished by hardware. Hardware generates all gaps, sync bytes, preambles, CRC bytes and postambles, the firm said.

Software packages for the controller include an initialization program, diagnostic program and driver. The controller is priced at $3,000 from the firm at 3303 Harbor Blvd., Building K4, 92626.

System/7 Operator's Console Bypasses Regular Channel

ANN ARBOR, Mich. – The Interautomation, Inc. Model 2501 operator's console is said to make more efficient use of the IBM System/7.

With the Model 2501, full utilization of System/7 capabilities is possible through an increased level of communication between the operator and the computer, the company said.

The 2501 connects to the computer digitally, permitting an increase in the level of communication without using any of the System/7's regular communication channel, the company added.

Interautomation Model 2501 Operator's Console

Eight Consoles Allowed

The Model 2501 can be added to existing System/7 installations or it can be included in the design of new systems. A multichannel serial interface is available which, because of the small number of digital inputs and outputs required by the 2501, allows up to eight consoles to be incorporated with each System/7, the firm said. The consoles can be remotely located up to 2,000 feet from the computer.

A complete software and hardware interface package is said to enhance the operation of the System/7 in applications such as process control, production monitoring systems, laboratory operations, operator process communications, production test systems and metal working monitor systems.

The human engineered 2501 console houses a full alphanumeric keyboard, CRT display and lighted push-button function switches and indicators. In addition, an auxiliary line printer is available for use where a hard-copy printout of the CRT display is required.

Interautomation has priced the console at $12,500. The firm is st Plymouth Building, 2929 Plymouth Road, 48105.

Larger Data Tablets Added To Cybergraphic Series

SCOTTSDALE, Ariz. – Two larger data tablets, 14 in. by 14 in. and 22 in. by 22 in., are now available in the Talos Cybergraphic Series.

Both tablets have 100 line/in. resolution and ±.010 in. accuracy, repeatability and linearity; 200 line/in. models are also available, the company said.

Talos' closed loop, all electronic writing servo is said to assure long-term stability and accuracy. The tablets are low profile, flat and have a rugged formica surface, and the system is not affected by the environment or stray magnetic fields, the firm said. Units are permanently calibrated and never need realignment.

A 14-in. system is priced at $2,495; a 22-in. system at $2,750. Interfaces are an additional $350. Talos Systems is at 7311 E. Evans Road, 85260.

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It's called *Computerwoche*, (woche is pronounced vō-kuh), and it's *Computerworld's* new sister in Germany. Modeled after its parent, *Computerwoche* serves key computer users in Europe's largest EDP market. It has an initial circulation of 22,000 including company officers, managers and top technical people at user sites throughout the German market, as well as officers and planners at computer equipment producing companies.

Computerwoche is published by Computerworld GmbH, with a full editorial and production staff based in Munich, and it will serve the German market with the same editorial excellence that has made *Computerworld* a leading EDP publication in the United States. A recent readership study by IDC Deutschland has shown that German users give highest readership priority to information on new products and services and new techniques for the application of computers. And *Computerwoche* will focus on serving those needs.

The market which *Computerwoche* serves is large and growing. At the end of 1973, there were 11,000 computer systems in Germany, valued at just over $4 billion, and recent market studies indicate that expenditures will be growing rapidly over the next four years. Overall user spending is expected to grow at 14% a year, and areas like terminals and communications equipment and software and services are expected to average growth rates of 25%–30% a year.

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Accelerator Injects New Life Into Budget-Bound 360/30

(Continued from Page 27)

IBM maintenance of the mainframe had ended when the CHCS modifications began. The people from Comma Corp., who were now doing maintenance, did not seem that familiar with the equipment, Mason said.

A CHCS engineer flew up from Philadelphia and resolved the hardware problems after the site had been down for a 48-hour stretch, he continued. The engineer has since had some training sessions with the Comma people, and the college now keeps spare parts on hand.

The maintenance situation is now proceeding smoothly, Mason said. IBM and the other vendors continue to service the peripherals.

The hardware enhancements continue to bring a 30% to 40% throughput gain on the disk handling and core jobs where there is a lot of storage involved and a lot of calculations, Mason said.

The hardware modifications have also improved on-line response times, bringing them into the four to five second range, he added.

Batch processing throughput gains depend on the I/O involved, Mason noted, since a relatively slow printer can mask the mainframe's faster processing.

The lack of core before the changeover had also hampered the college's plan to go to an on-line retrieval and update system, Mason added.

Since it could not afford a larger mainframe, the college leased an IBM System/7 processor a year and a half ago to act as a front end to the 360. Lack of core impeded use of a 2703-type communications controller, Mason said, because it would have left too much of the communications handling in the mainframe.

The college DP staff programmed the System/7 with a home-grown package based on previous IBM work for a New York Hospital. The System/7 handles all I/O and the fixed format screens for 12 Hazeltine 2000 CRTs and also does some editing, he noted.

The System/7 software was written in P-code, a modified BAL. Application programs on the 360/30 are in Cobol.

More Functions On-Line

Although the on-line system was up in January, it was only when the extra core was installed in July that the college could add on-line updating to the registrar's office without dedicating the computer to that task, Mason observed.

The college has also added on-line student record inquiry in the bursar's office, Goulandris mentioned. Updates are batched on disk and processed nightly. An IBM 3881 mark sense device reads results from the student testing office, does grading and even reads the data from instructor evaluation forms the students hand in.

The DP staff is working on automating the dean of faculty's office and already has a complete, on-line faculty base, Mason said.

And Goulandris added that within a year he hopes to see the college business office staff entering data on CRTs and producing hard-copy purchase orders in one operation.

There are also plans to replace the current batch update method with an on-line registration system within the next six months, Mason continued.

The staff is considering both Hewlett-Packard and Documation mark sense card readers, he said. The mark sense device will read student registration cards and transfer the information to a CRT screen, where an operator will sight verify the data and transmit it to the System/7. The CPU will check the forms for course conflicts, pre- and corequisites and other eligibility factors.

The college then plans to have Memorex 1240 printers produce the students' bills, which will be paid at NCR point-of-sale terminals linked to the System/7, which will then note the student's payment on the 360/30's Isam student data base.

"Right now the problem is that the 360/30 is still slower than everything else we have," he remarked. The shop has nine 2314 disk drives and three 2314-equivalents from Memorex. There are also three IBM 3420 tape drives.

The college also has the faster 1403 N1 printer, a 3211 printer and 2501 2540 card readers.

An IBM 3704 communications control unit in the shop is currently being used as a remote job entry terminal to dual IBM 370/168s at the Board of Education.

Even though the accelerator had sped things up considerably, Mason said the shop is degrading performance now by running one on-line and two batch partitions instead of the one used previously.

Plotter Users Plot Happy Course

DELRAN, N.J. – While the hoopla that surrounded the entrance of digital plotters has diminished over the last several years, a quiet revolution has taken place, as increasing numbers of users have installed plotters for the production of graphic representations of business information, according to Datapro Research Corp.

In a recent survey of plotter users, Datapro found users generally satisfied with the overall performance and accuracy of their equipment, but a number of users "expressed serious reservations" about the speed of plotting and about the associated software and technical support.

Usable responses to the survey were received from 93 users with a total of 112 digital plotters installed. Their usage of the three basic types of plotters was: drum, 78%; flatbed, 18%; electrostatic, 4%.

With respect to configuration, 38% of the plotters were on-line to local computer systems, 10% were used as time-sharing terminals and 52% were off-line, according to the survey.

The principal plotter applications reported by the respondents were: graphs and bar charts, 84%; drafting, 82%; interactive design, 15%; and other applications, 22%. (The total exceeds 100% because many users indicated multiple applications.)

The survey is part of a report, "All About Digital Plotters," priced at $10 from the firm at 1805 Underwood Blvd., 08075.

The ratings from the survey indicated the users of flatbed plotters were better satisfied, on the whole, than the users of drum-type or electrostatic plotters.

One noticeable complaint voiced by slightly over 10% of the respondents dealt with the problems and manipulations required when using pens and liquid ink systems.

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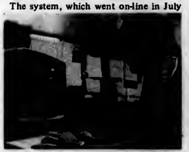
Transmits Crime, Vehicle Data

Around-the-Clock System Aids Police

ROCHESTER, N.Y. – The police department here is proving that "crime doesn't pay" with the help of a DP system which aids in quick relay of information.

The system, which went on-line in July 1973, links 10 CRT terminals and two keyboard terminals to an IBM 370/145 and provides Monroe County policemen with important criminal and vehicle data files stored in the computer.


The operator of the central IBM 370/145 responds to a system request for data initiating daily docket preparation.

Generating detailed statistical records of crimes, arrests, accidents and calls for service, besides listing the court docket and retrieving of criminal warrants and histories, are all part of the service handled by the computer.

The network has distributed terminals throughout the county to help police with any questions that might arise.

Although it is now on a county level, the police department would like the system to interface directly with state and federal data bases, according to Richard Gana, director of information services for the department.

The instant, around-the-clock access to the data system is both secure and simple. It consists of "signing on" to identify the operator and a few keystrokes to obtain the desired information.

If a policeman wants to see one of Monroe Counties' 500,000 auto registration records, the license plate number or owner's name is keyed into the computer and the name, address, sex, race and date of birth, of the owner, as well as the vehicle year, make and identification number, appear. The readout also indicates whether the vehicle or plates are stolen.

The stolen vehicle/plate files are updated on-line via two 2740 terminals, making the information immediately available on all network terminals.

A "hot sheet" of stolen vehicles is updated every 30 days by the 2740s.

Warrant and criminal history files are accessed directly by name or by alias, Gana said.

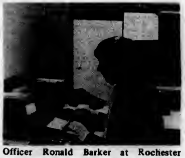
Sgt. Anthony Chiappone discusses entry of police calls for service with a data entry operator in the records section.

Warrant status updates are made on-line, while an off-line warrant analysis program, which generates served and cancelled warrant records daily, is mailed to all towns in the county.

The criminal history file is generated and updated from current arrest reports. Previous arrest histories can be keyed in either by name or alias and if necessary narrowed down by additional specific information.

Four police terminals are devoted to on-line entry statistics on crime, accidents and calls for service. The information, taken from general, accident and stolen vehicle reports, serves as input for internal reports as well as reports for such external agencies as the FBI, the New York State Department of Correction and the National Safety Council.

The system has proven successful and, according to Gana, has increased the potential for crime prevention. Plans are being made to broaden the tasks and operations of the system.


Officer Ronald Barker at Rochester Police Department's dispatch center retrieves warrant information on visual display terminal during a license check procedure requested by a patrol unit.

DP Case Histories Detailed by UK Book

MANCHESTER, England – In an effort to fill the vacuum of practical material available to illustrate the basic principles of investing in and applying computer systems, NCC Publications here has published a textbook entitled "Data Processing Case Histories."

The 10 cases demonstrate the decision-making process at all levels, ranging from the initial investment in a computer system to a design philosophy for the individual system.

The studies fall into three categories – "A Question of Direction," which concentrates on the big decisions, "Over the Credibility Hurdle," concerning the usefulness of DP itself, and "More Than One Way Home," about design and implementation problems.

Each case is prefaced by a list of terms used and followed by suggested discussion points and a summary of the lessons to be learned.

NCC Publications suggest the book for university and polytechnic courses in DP, computer science and business.

Edited by G. Penney, the text is available from NCC Publications, David and Charles Holdings Ltd., S. Devon House Railway Station, Newton Abbot, Devon for 3 UK pounds (about $7.20).

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Count On Memorex

Bug-Counting System Still Needs Debugging

LAS CRUCES, N.M. – After two years of trial operation, researchers at New Mexico State University are still working to get the bugs out of a bug-counting computer.

The insect identification and counting system, developed to monitor the pest population in cotton fields with an eye toward reducing the use of pesticides, is now about 85% to 95% accurate.

And 100% accuracy is not far off, predicted J.W. Atmar, one of the project's developers. Two problems still have to be solved.

Handling the Bugs

The first involves the actual handling of the insects. Each bug is now placed by hand on cards which are scanned by the computer, a time-consuming process.

Placement of the bugs on the cards is the second problem. Atmar observed that the bugs must be kept from touching each other so that the computer won't read a group of bugs as one big bug.

"All human intervention has to be reduced to as little as possible," Atmar said, noting the researchers are working on "a mechanical placement machine – an insect separator – because it's so much work to put the bugs down by hand."

When perfected, the computer will allow mass counting and classification of up to 5,000 insects at one time and provide rapid population estimates on a day-to-day basis, allowing cotton producers to apply pesticides only when needed.

Giant Bugcatcher

At present, pesticide applications can vary from none at all to as many as eight per season due to the sporadic nature of damaging insect populations. An estimated one-fourth of these are made as a result of seeing neighbors treating their fields.

Researchers collect the insects for the study with a giant bugcatcher mounted on a high clearance tractor that blows 70 miles-per-hour winds across cotton fields, automatically gathering up the dislodged insects.

These field samples are then placed in an instrument consisting of a scanning microscope photometer and a computer. The computer identifies the insects on the basis of pattern recognition by reading the color, size and shape. So far, the computer has been programmed to read a dozen different types of bugs.

Going to the Dogs...

WESTLAND, Mich. – This city of 100,000 has found another job for its small computer: assistant dog catcher.

The IBM System/3 Model 10 contains license numbers for all registered dogs and includes a description of each dog and its owner. Consequently, the process of locating a dog has been speeded up, an advantage in cases where a child has been bitten and proper treatment must be given quickly.

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Monthly Costs Down 61%

Replacement for T/S a Feather in Bank's 'CAP'

SAN FRANCISCO – A computer dedicated to the complexities of corporate customer relationships keeps Wells Fargo Bank loan officers here continuously appraised of the profitability of corporate accounts while enabling the bank's customers to make optimum use of various combinations of loans, deposits and other services.

The computer, a 128K Hewlett-Packard HP 3000, was installed last May to overcome report lead time and cost problems encountered with a time-sharing service.

As a result, Wells Fargo operations officer Sheila Dummer, who supervised the installation, said, "Our reports are now timely instead of three to four months overdue, and our computer costs 61% less than former time-sharing fees." Wells Fargo's computer rents for $5,000/mo compared with $13,000 previously spent monthly for time-sharing.

Its multiprogramming feature allows concurrent running of batch-oriented and time-sharing applications. Thus, while the system here generates a monthly customer account report on a batch mode, a bank officer in Los Angeles may inquire in a time-sharing mode the effect contemplated changes in a compensating balance or advance in loan funds will have on the account's projected profit return.

The bank's successful switch of its Corporate Account Profitability (CAP) system to the HP 3000 has resulted in a 50% increase in corporate account work load with nine other reports added within three months after installation.

The basic objective of the CAP system is to monitor the profitability of individual corporate accounts to the bank while offering the customer the best of many options from his vantage point for a variety of bank services.

Inputs to the former time-sharing system were exclusively punched card, read into a 2780 emulator and communicated via long-distance phone lines to the service bureau.

Now only 29% of the input is manually keypunched. Almost 65% rides free as a by-product of the bank's centralized IBM 370 (an output tape is compatible with the HP 3000), and almost 6% is entered by loan offices through terminals located here in Palo Alto and in Los Angeles.

Two video display terminals now being installed will reduce the keypunching load further to 9%.

Reports generated by CAP on a monthly basis include an analysis of loan, deposit and service activity by customer, loan officer, geographic area and division. Among the computations shown on the report is a total relationship indicator which summarizes the total profitability of the relationship.

Quarterly the monthly analysis and activity report is issued on a moving average basis to smooth out cyclical effects.

Wells Fargo Bank's Sheila Dummer, assistant operations officer, and Michael Park, corporate banking officer, observe a CAP printout from the bank's HP 3000 computer.

Citizens With Gripes Get Help From System

LOUISVILLE, Ky. – Irate citizens here are finding they no longer have to wait months before city officials come to grips with their gripes. Every call to Action Line, the city's complaint center, is now being stored in a computer to speed up the response process.

Before the computerized process became operational last month, complaints received at the center were filed by hand with the intention of following them up 10 days after they had been forwarded to city departments for action.

But it just didn't work. A recent inventory yielded 232 unsettled complaints in one city department, 70 in another.

Now the system prints a weekly list of all unresolved complaints more than 10 days old and the list is forwarded to the appropriate department. It also gives a reading of problem spots by location and type and generates a report for the mayor and board of aldermen broken down by department and aldermanic ward.

City officials claim Louisville is one of the first cities to use such a system and that there has already been a substantial decrease in backlogged complaints.

Potential Abusers Spotted

HARRISBURG, Pa. – Attempts to determine persons most susceptible to drug or alcohol abuse have been spurred on by a $296,000 National Institute of Drug Abuse grant made to the Governor's Council on Drug and Alcohol Abuse here.

The grant is being used to gather statewide information on abusers by unsigned questionnaires which are fed into a computer for data compilation.

Summaries of questionnaire results for each county and the entire state are mailed to all county agencies. The summaries provide a general profile of the drug or alcohol abuser which can then be used to spot and help potential abusers.

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Society Sundries

Compcon '75 Names Program Chairman

SILVER SPRING, Md. – Terry Opdendyk, manager of software development at Itel Corp., and Dr. Wendell Sander, manager of the memory research department at Fairchild R&D, have been appointed program chairmen for the 10th IEEE Computer Society conference; Compcon '75 Spring.

The conference theme is "Computer Technology to Reach the People." Opdendyk is responsible for the software portion of the program and Sander will specialize in hardware.

Lowell D. Amdahl, general chairman of the conference, will supervise the applications section.

Compcon '75 Spring will be held Feb. 25-27 in San Francisco. Further information may be obtained from Advance Program, Compcon '75 Spring, P.O. Box 639-P, 20901.

Irish, British Societies Discuss Growth in Data

GALWAY, Ireland – Problems arising from the explosive growth in data faced by computing installations was the main issue at the fifth annual conference of the Irish and British Computer Societies held here last month.

Papers were given on such topics as complex data relationships, data communications, the development of computing in Europe and data versus information. The final session was an open forum on privacy and security.

More than 90 delegates from both North and South Ireland attended the conference.

Information on the proceedings can be obtained from Terence Carville, Infoplan Ltd., 20 Eastbourne Terrace, London, England W2 6LN.

IEEE Picks Standards Head

SILVER SPRING, Md. – The Institute of Electrical and Electronics Engineers (IEEE) has named Dr. Tse-yun Feng, a faculty member of Syracuse University, as chairman of its Computer Standards Committee. He will be responsible for studying the need for new or revised standards and will represent the society in cooperating with standardizing bodies outside the IEEE.

Feng is presently a Distinguished Visitor of the Computer Society. He has served as session chairman or panelist at several conferences and initiated the Sagamore Computer Conference on Parallel Processing.

At Syracuse University, he teaches in the Department of Electrical and Computer Engineering and specializes in the areas of computer architecture, associative/parallel processing, switching theory and logic design.

TI Mini Users Incorporate

HOUSTON – Texas Instruments Minicomputer Information Exchange (TI-MIX), a minicomputer user group, was recently incorporated as a nonprofit organization.

TI-MIX was organized in October 1973 to facilitate the exchange of information between minicomputer users. There are now over 1,000 members on record, with no dues or fees charged for membership.

Services provided by the group include programs for a software library, a publication for members every two weeks and an annual symposium. Regional meetings are held at 13 locations in the U.S.

Further information is available from Floyd Burton, TI-MIX Director, or Pat Roddy, TI-MIX Coordinator, P.O. Box 1444, M/S 784, 77001.

Future NCC Sites Chosen

MONTVALE, N.J. – New York and Dallas have been chosen as the future sites for the 1976 and 1977 National Computer Conferences (NCC) by the NCC Board.

In 1976, NCC will be held at the New York Coliseum, the site of the '73 conference, during the week of June 7-10. The 1977 conference will be at the Dallas Convention Center June 13-16.

This year, NCC will take place in Anaheim, Calif., May 19-22.

Calendar

Dec. 2-3, Boston – National Microprocessor Conference sponsored by Arthur D. Little, Inc. Contact: Marjorie Maws, Arthur D. Little, Acorn Park, Cambridge, Mass. 02140.

Dec. 3-4, Washington, D.C. – Sixth National Transportation Forum and Exhibition, with the theme "Electronic Systems Serve Transportation." Contact: Transportation Data Coordinating Committee, 1101 17th St., N.W., 20036.

Dec. 3-6, San Francisco – 20th Annual Conference on Magnetism and Magnetic Materials. Contact: Conference Steering Committee, c/o I.S. Jacobs, General Electric R&D Center, P.O. Box 8, Schenectady, N.Y. 12301.

Dec. 5-6, San Francisco – Annual Joint Conference of the California Educational Data Processing Association and the California Educational Computer Consortium. Contact: Dr. James S. Lucas, Santa Clara Unified School District, P.O. Box 397, Santa Clara, Calif. 95052.

Dec. 9-11, Washington, D.C. – 1975 College and University Systems Exchange (Cause) National Conference. Contact: Cause, 737-29th St., Boulder, Colo. 80303.

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Data Communications is a complicated and rapidly changing field. And this seminar will give you the information you need to keep on top of the subject. Led by the nationally recognized teleprocessing consultant, Dr. Dixon Doll, the course covers recent changes in areas like SDLC, HID-LoD, DDS, newly approved major revisions to WATS, and the impact of satellite carriers and specialized carriers.

The course will also cover general data communications topics, including intelligent terminals (performance and selection criteria), network software handlers (e.g. CICS) and network organization and design. And, you'll learn about saving money using such innovative concepts as split-stream modems, remote-multiplexers/concentrators, diagnostics for fault isolation and front-end processors.

All participants in this seminar will receive a 2-volume loose-leaf outline of all course materials (prepared by ICC Institute), a copy of "Data Modems Selection and Evaluation Guide" by Vess V. Vilips and a "Data Communications and Teleprocessing Dictionary".

This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for a reduced rate of $300 Current schedule is as follows:

Miami	Miami Marriott	December 2 - 3
Los Angeles	Los Angeles Marriott (Airport)	January 13 - 14

To: Ed Bride, Vice President, Editorial Services, Computerworld
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CI Notes

Honeywell Bull Denies Talk of Merger With CII

PARIS – Honeywell Bull has denied reports of efforts to merge it with Compagnie Internationale pour l'Informatique (CII).

The move, reportedly under consideration by the French government, would bring Honeywell Bull into the Unidata complex through its affiliation with member CII. Siemens and N.V. Philips are also members of Unidata, which was founded to compete with IBM in the European computer market.

Honeywell Bull said it has not received any proposals from CII or the French government. Honeywell Bull is 66% owned by an international unit of Honeywell, Inc. in which GE also has a small interest.

The remainder is owned by Compagnie des Machines Bull of France. CII receives direct and indirect French government assistance.

DCC to Supply Redifon

FAIRFIELD, N.J. – Digital Computer Controls, Inc. has received an order for 500 D-116 minicomputers from Redifon Electronic Systems Ltd. Delivery will take place over a two-year period. Redifon makes a key-to-disk system.

Interdata Launches Vertical Effort

OCEANPORT, N.J. – Interdata, Inc. has established a Market Development Group to identify key vertical industries and special applications areas for which it will help develop hardware and software tools tailored to each area.

"Early targets for the group will be the electric utility industry and data communications applications," said Ronald A. Paterson, marketing vice-president.

Supershorts

Teletype Corp. has gold-plated its 500,000th Model 32/33. It will be on display at corporate headquarters and trade shows.

– – –

A group of 13 minicomputer firms has elected to join the 1975 British Computer Caravan rather than put on their own show.

Interdata, Inc. has established a European Division of its Software Development Group to bring software development closer to the end user.

– – –

Varian Data Machines is working on the V80, which is said to be a "different kind of mini" for the firm, not a modification of its current product line.

Justice Brief Shows

IBM Skewed Market Figures to Cut Share

By Molly Upton
Of the CW Staff

NEW YORK – IBM's "Project Yardstick" illustrates that IBM attorneys and top management "recognized that IBM's own figures on market shares evidenced IBM's monopoly position and that these admissions had to be stopped," according to the brief filed recently by the Justice Department here in its suit against IBM.

Project Yardstick was a means by which the firm altered the base used in measuring market share in order to reduce its percentage of the market. The move, instigated at the behest of IBM attorneys who were attempting to persuade the government of the absence of IBM's market power, encountered resistance by marketing and forecasting personnel, the brief said.

George Beitzei, general manager of IBM's Data Processing Group, rejected implementation of the new approach in July 1968 for budget reasons. It was a low priority item, the brief said.

However, IBM's internal corporate counsel met with Beitzei and ordered the change which was then implemented.

Lease-Only

IBM's new measurements included only leases and excluded purchases from IBM's market share measurements. At a management committee meeting in October 1968, the effects of alternatives, including the lease-only method, were illustrated.

"IBM market share of installed systems using the traditional method was 74% for year-end 1967. By expanding the measurement base it dropped to 60%. IBM's market share for year-end 1968 was 73.7%," according to the brief.

"Even without including the effects of expanding the market measurement base beyond systems, by using the 'lease-only' measure, IBM's 'share' of installed and on-order points dropped to 60.7%," it added.

As admitted in that presentation, the latter share would be used "only to measure market power. Other measures would be used for marketing guidance."

The lease-only share was used to present IBM's official share of the market to Washington in early 1969, the brief said.

"As shown several months later, the difference just between the two share methods was between a 71.2% share and a 48.7% share respectively," the Justice Department said.

But internally, the changes were not readily accepted. IBM forecasters in 1968 termed the proposed measurements "misleading," and the director of industry marketing said he felt his problems could best be handled without these adjustments.

But he was persuaded by Hilary Faw, who has testified he was reporting to IBM's attorneys, to adopt the new statistics, the brief said.

Statistics Detailed

The market share statistics that IBM sought to alter with the project are also contained in the Justice Department brief, which illustrates the importance IBM attaches to maintaining its market share.

Internal statistics prepared by IBM show its market share of systems installed remained relatively constant over the period 1961 to 1972 and consistently in excess of 70% of the market, the brief pointed out.

A memo by Thomas J. Watson Jr., then chairman of the board, set as IBM's primary goal maintenance of its market share.

"It has always seemed to me relatively simple to state the goal in the following fashion – that IBM should attempt to maintain its market share in the immediate foreseeable future . . ."

IBM statisticians tracked market share in three ways: installed position, net position and net product increase. Net position measures the total value of installed systems in the market and adds to that the total value of current orders for equipment, with allowances for the equipment expected to be removed.

Differences between the installed and net position result because installed always lags behind changes in net, which records the impact of orders and displacements scheduled to occur.

Figures for the installed base of general-purpose computers, from the size range of 360/20 to 360/67, show that from 1961 through 1964, IBM held 80% of the market, except 82% in 1962. In 1965, IBM hit a high of 84% with the installation of the 360 Series.

IBM's share tracked consistently from 1966 within a range of two points from 74% in 1966 to 73% in 1972, hitting 75% in 1967-69.

Even with the inclusion of larger computers, models 360/90, 85 and 75 and competitive machines, IBM's market share of installed base was almost identical and always above 70%, Justice noted.

In terms of net position, from 1965 to 1972 for general-purpose computers, IBM was a consistent 75%, except 76% in 1970, from 1965 to 1971. During 1972, the share dropped to 71%, according to figures in the brief.

However, some variation in statistics can be viewed by comparing the installed base and the net position of large computers, which illustrates the entry of other firms, especially Control Data Corp., into this marketplace. IBM's installed position never dipped below 69% and reached 83% in 1972, the brief said.

On an installed base, IBM's share in 1965 was 78%; in 1969, 95%; and 1972, 83%. However, in net position, IBM in 1965 had 43%; 1969, 79%; and 1972, 53%.

"These differences result from the fact that the value of orders for equipment is substantially larger than the values of the equipment actually installed and that IBM had the larger share of those machines actually installed than it did of machines on order," the Justice brief explained.

U.S. DP Shipments Seen Reaching $17 Billion in 1980: Commerce

WASHINGTON, D.C. – Shipments of computers and related equipment should grow at an average annual rate of 10% through the rest of the '70s, reaching an annual total of $17.1 billion in 1980, the Department of Commerce said in its report, *U.S. Industrial 1975 Outlook.*

This rate, however, is down from the expected 22% growth to $9.6 billion in 1974 and 14% to $11 billion in 1975, the report noted.

Exports should continue to boost the favorable balance of payments. Exports in 1975 should rise 20% to $2.8 billion. This compares with $2.3 billion in 1974, the report said.

The value of DP imports is expected to grow to $140 million in 1975, a 17% increase over the estimated $120 million in 1974.

The trade balance in the computer area will approach $2.6 billion by 1975, up from about $2.2 billion in 1974.

However, the report warned of expected competition from Japanese firms in the U.S. minicomputer market and mentioned Unidata may emerge as a factor to be considered in European markets.

"Software is generally expected to be the major area of emphasis during the remainder of this decade, subordinating hardware developments," the report noted.

"Because of such problems as annual shortfalls in programming personnel, unreliable programs and the need for new programs to handle the increased complexity of applications, users and manufacturers will be forced into a closer working relationship," the report observed.

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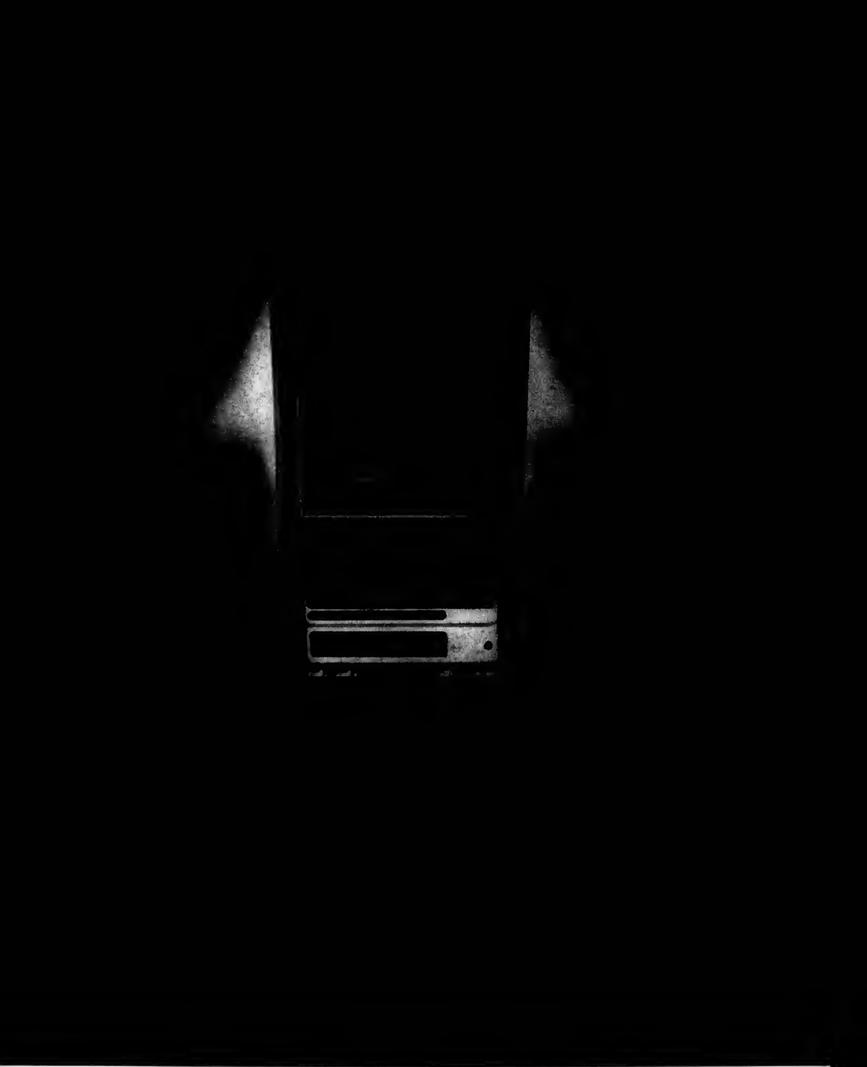

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Hewlett-Packard Sales Thrust Views Terminals as New Market

NEWTON, Mass. – The Hewlett-Packard Co. (HP) is looking at the terminal market as an entirely new marketplace for that company, not just as an adjunct to its CPU sales, according to Ed McCracken, marketing manager of HP's Data Systems Division.

With the introduction of the HP 2640A [CW, Nov. 6], the firm has chosen to compete with the Dataspeed 40 market.

The HP unit does not presently contain a storage medium, but future plans call for some type of cartridge or cassette, perhaps a smaller version of the 3M Co.'s cartridge.

HP plans to gear up separate marketing and development forces for its line of terminals. The market for terminals includes not only the OEM area and saies with HP systems, but also individuals and firms that want to buy terminals, McCracken explained.

HP also plans to come out with low-priced terminals in the $1,000 range that are "glass Teletype replacements," as well as units in the $6,000 range that are user microprogrammable with off-line storage, he said.

McCracken said cost reductions will predominate throughout the mini industry.

Within three years, the price of an HP 3000 could be down to $20,000, he predicted. This would be made possible through the use of three LSI chips.

HP is "totally dedicated to obsoleting" the 3000 and its other CPUs as fast as possibie, he said, explaining he feels users want cheaper machines as long as software is compatible.

Although this is a different philosophy from the past, when manufacturers had been protecting their rental base, McCracken noted HP can aim to do this since it does not directly rent its machines.

One factor that helps HP to be competitive in the OEM market is that it makes most of its own peripherals, McCracken said.

HP plans to introduce a cartridge disk system in the 15M-byte range within a couple of months, he added.

Consolidation

In other areas at HP, the sales and service forces of HP's new Computer Systems Group have been consolidated into a single organization under Ben L. Holmes, who was named group marketing manager.

This brings together the forces of the Automatic Measurement Division and the Data Systems Division, which had been operating separately.

Richard W. Anderson, former general manager of the Automatic Measurement Division, has been appointed general manager of the Data Systems Division.

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The computer is coming to the point of sale, and *Computerworld's* Retailing supplement will be looking at POS systems, credit authorization systems and much more.. As well as several applications stories, our November 27th report will contain articles like these:

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- Some of the problems you'll encounter with POS.
- How to select POS terminals.
- UPC, where is it going?
- Survey of available hardware.
- The current state of scanner technology.

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Orders & Installations

Western States Bankcard Association has ordered $2.6 million worth of Trace item processing equipment from Recognition Equipment, Inc. The systems, one single transport and one double transport, will be used to streamline credit card processing operations.

Continental Can Company, Inc. will install turnkey minicomputer system from Mini-Computer Systems, Inc. at its Bleached Products Division plant. The system features an on-line inventory control system and dial-up access.

Cape Cod Bank and Trust Co. has ordered an automated teller information system from Datatrol, Inc. The system, a Datatrol TPS-370, will be used at 11 branch offices.

Cala Foods, Inc., a chain of 19 supermarkets, is installing three NCR 255 store systems with 21 checkout terminals and three NCR 726 computers.

Stephen F. Austin State University has ordered a Xerox 560 system to handle both academic and administrative DP as well as to provide support for the east Texas adult education program.

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ROBERT V. JACOBSON is involved in data security and related activities at the Chemical Bank headquartered in New York City. His diversified experience includes computer simulations of weapons and radar systems at Raytheon Company. He later joined Bolt, Beranek and Newman, Inc., and served as General Manager of TELCOMP, a pioneering time shared computer service. He founded Bradford Associates, Inc. and specialized in computer security consulting. As President, he directed projects for industrial firms and financial institutions. Bradford Associates merged with Sentor Security Group, Inc. in 1972. Mr. Jacobson was Vice President of the Consulting Division until his present affiliation with the Chemical Bank. He co-authored the book *Computer and Software Security.*

ROBERT P. ABBOTT is Manager of the Research in Secured Operating Systems (RISOS) Project at Lawrence Livermore Laboratory. The goals of RISOS is to establish security guidelines for computer operating systems of the future, for existing time-shared systems, and for government agencies which in the future may be charged with certifying that a system is secured. Prior to RISOS, Mr. Abbott was Director of the Research Data Facility, the Institute of Medical Sciences. He was also General Manager, Application Division at Berkeley Computer Corporation.

LINDSAY LAIRE BAIRD, JR., is General Manager of Advanced Computer Techniques, Security Consulting Division. He has recently completed service in the U.S. Army's Military Police Corps as a Lieutenant Colonel. His experience includes law enforcement, industrial security, physical security and contract administration including eleven years in data processing and nine years in intelligence and classification management. He developed the Army's first automated police management information system and authored the first comprehensive Army regulation to establish D.P. security criteria.

PETER S. BROWNE is Manager of Security Operations for the G.E. Information Services Business Division. Prior to joining G.E., he was responsible for the development of the computer security program at State Farm Mutual Auto Insurance Company. He has dealt with security of computer information as a staff officer in the Air Force. His computer background was as a programmer, senior analyst and systems designer. Mr. Browne is active in many national professional societies, was chairman for two ACM chapters and frequently speaks on the subject of computer security.

ROBERT H. COURTNEY, JR. is IBM's Manager of Data Security and Privacy. He is responsible for establishing architecture and design criteria for data security in IBM's hardware and software, and assuring their incorporation into these products. He joined IBM in 1960 as Manager, Intelligence Systems Department, in the Federal Systems Division in Washington. He later managed the Displays and Graphics Development group which introduced display and graphics into the IBM product line. Mr. Courtney's work is published in the proceedings of numerous conferences and symposia, IBM publications and in the Computer Law Service.

LEONARD I. KRAUSS is a Management Consultant at Ernst & Ernst. His experience is in the areas of planning and control systems, data processing management, and information systems security. His systems planning and development experience includes a variety of computer applications for financial institutions, manufacturers and service companies. Mr. Krauss was previously associated with IBM and Union Carbide. He has written three books including SAFE: *Security Audit and Field Evaluation for Computer Facilities and Information Systems.*

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SCHEDULE OF EVENTS AND SPEAKERS

Monday, December 2, 1974

Registration & Continental Breakfast (8:15 a.m.)

Welcoming Remarks (9:00 a.m.)
Robert V. Jacobson,* Conference Chairman

"Computer Security—A Risk Management Approach"
Peter S. Browne,* G.E. Information Services Business Division

"A Systematic Approach To Data Security"
Robert H. Courtney, Jr.,* IBM Corporation

"The Role of Regulatory Agencies in EDP Records Management"
Belden Menkus,* Consultant

"Legal Gaps & Traps"
Susan Nycum, MacLeod, Fuller, Muir & Godwin

"The Internal Auditor—Should He Be A Consultant?"
Joseph J. Wasserman,* Computer Audit Systems, Inc.

Guest Speaker:
Congressman Edward I. Koch of New York, co-sponsor of the "Comprehensive Right to Privacy Act"

Luncheon

Afternoon Workshop Session
Morning speakers analyze and discuss case histories/audience participation

Hospitality Hour/Press Conference

Tuesday, December 3, 1974

Continental Breakfast (8:30 a.m.)

Program Begins (9:00 a.m.)

"System Design and Development: Security and Integrity Considerations"
Lindsay Laire Baird, Jr.,* Advanced Computer Techniques, Security Consulting Division

"Internal Controls To Deter Fraud and Embezzlement"
Leonard I. Krauss, Ernst & Ernst

"EDP Insurance: An Informed Buyer's Guide"
Guy R. Migliaccio,* Marsh & McLennan, Inc.

"Integrated Physical Security Systems and Procedures"
Timothy J. Walsh, Harris & Walsh Management Consultants, Inc.

"Auditing Software Integrity: Burglarproof Programs"
Robert P. Abbott,* Lawrence Livermore Laboratory, University of California

Luncheon

Afternoon Workshop Session
Morning speakers analyze and discuss case histories/audience participation

*Computer Security Institute Advisory Board Members

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LIST NAMES OF ADDITIONAL ATTENDEES ON SEPARATE SHEET

BELDEN MENKUS has spent twenty years helping management improve administrative systems and information handling techniques. He is a regular contributor to *Administrative Management* and an advisor to *Security Letter.* In 1963 he founded *Records Management Journal* and edited it for five years. Mr. Menkus lectures and writes extensively and was a recent contributing editor to the *Computer Security Handbook.* He is listed in current editions of Who's Who in Computers and Data Processing, Contemporary Authors and the Working Press of the Nation.

GUY R. MIGLIACCIO is an Assistant Vice President at March & McLennan where he has been actively involved in the insurance aspects of computer security. He frequently analyzes and measures risk exposures for clients and has developed insurance programs to cover those risks. He conducts seminars for the National Risk Management Conference sponsored by the American Society of Insurance Management. He frequently speaks at computer security seminars sponsored by the American Management Association. Mr. Migliaccio has also contributed to the *Computer Security Handbook.*

SUSAN H. NYCUM is an Attorney with MacLeod, Fuller, Muir & Godwin where she has concentrated on computer law. Mrs. Nycum is the principal legal consultant to the Stanford Research Institute's computer abuse project. She was formerly Director of Stanford University Campus Computer Facility and is currently Chairman, Standing Committee on Legal Issues of ACM. She is a member of the Bar of California, Pennsylvania and the United States Supreme Court.

TIMOTHY J. WALSH is President of Harris & Walsh Management Consultants, Inc. Earlier he was Security Manager with the Sperry Gyroscope Division of Sperry Rand Corp. and with the former A.B. DuMont Labs. He served with the U.S. Naval Intelligence Service and the U.S. Air Force Office of Special Investigations. Mr. Walsh is a member of the New York, federal and U.S. Supreme Court bars. He is a former President and Board Chairman of the American Society for Industrial Security and a former adjunct assistant professor at N.Y.U.

JOSEPH J. WASSERMAN is founder and President of Computer Audit Systems, Inc. He has held management positions with the Bell System including the Internal Audit Manager of AT&T. He was also Manager of Audit Development and Research for Bell Laboratories, being responsible for internal controls in all systems designed, evaluation of testing and conversion procedures, and insuring the future auditability of all management systems. Mr. Wasserman lectures widely and has written extensively. His reports on computer security, as published in the New York Times, was reprinted in the Congressional Record.

GUEST SPEAKER

CONGRESSMAN EDWARD I. KOCH of New York has been devoting his full time to a wide variety of timely issues since he went to Congress in 1969. He has been a long time advocate of the right to privacy and has recently sponsored several bills including H.R. 667 and H.R. 14163. The latter, which he sponsored with Rep. Barry M. Goldwater, Jr., would establish a Federal Privacy Board and regulate the collection of data in both the private and public sectors. Rep. Koch serves on the Banking and Currency Committee and the House Committee. He is a member of four subcommittees of the Banking and Currency Committee: Urban Mass Transportation, Consumer Affairs, Small Business, and International Trade.

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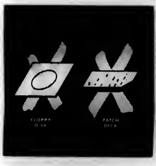

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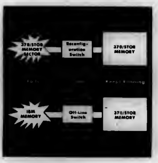

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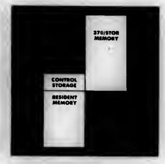

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A Question of Bundling

Decision on Univac-USC Case Reserved

By Molly Upton
Of the CW Staff

PHILADELPHIA – Judge Clifford Scott Green has twice reserved decision on Univac's pleas to dismiss the case brought against it by United Software Corp. (USC). The independent supplier of a tape labeling package seeks a preliminary injunction barring the release of Univac's Ansi standard 1 tape labeler for the 1108 unless Univac charges separately for the product.

USC sells tape labeling packages for use on Univac Series 1100 computers.

Although the suit is limited to seeking unbundled prices on the tape labeler portion of the operating system, it could have more far-reaching effects by encouraging Univac to reconsider its bundling policy.

Tie-In Arrangement

During the trial, USC has argued that Univac's bundling policy violates antitrust laws because it constitutes a tie-in arrangement. Univac's premature product announcements have also served to stifle competition, the plaintiff argued.

In addition, USC charged that Univac had threatened to withdraw some of its on-site support for its operating system at certain installations if the user installed a foreign tape labeler.

As a result of this threat, USC said, the user canceled his order for a USC tape labeler.

Martin Goetz, Applied Data Research vice-president of marketing, testified as an independent expert at the request of USC that bundling had an anticompetitive effect.

Stifles Growth

Bundling stifles the growth of independent software firms by making it almost impossible for them to sell products for bundled machines, he said.

In addition, Goetz continued, bundling has an anticompetitive effect on users as they face little choice in the selection of software.

The scope of software for Univac units could be much larger if users were charged for Univac's software since independents would bring out products.

Goetz also testified that unbundling would be good for Univac, enabling it to recoup some of its large software development costs.

Unbundling could also lead to development of software in response to demand, he said.

Management Decision

Neil Gorshaw, a Univac vice-president, explained bundling was a management decision based on marketing considerations.

USC, a spokesman said, contends that one of the purposes for Univac's bundling of its operating system is to prevent independent software houses from zeroing in on certain software packages that might be somewhat weaker than independent products.

Probst Cbema Chairman

WASHINGTON, D.C. – Gerald G. Probst, president of Univac, has been anmed 1974-75 chairman of the board for the Computer and Business Equipment Manufacturers Association (Cbema).

Honeywell, GE Revise Agreement To Simplify Acquisition Provisions

MINNEAPOLIS – Honeywell, Inc. and General Electric Co. have revised their agreement providing for Honeywell's acquisition of GE's 18.5% interest in Honeywell Information Systems, Inc.

Under the new provisions, the number of shares of Honeywell common which GE will receive will vary depending on when the option is exercised and will increase in annual increments. The old agreement was more complex involving a number of variables which could have been affected by stock market conditions.

If GE exercises the option in 1976, it will receive 1.5 million Honeywell shares, 1.8 million shares in 1977 and if either GE or Honeywell exercises the option in 1978, GE will receive 2.2 million Honeywell shares.

GE's interest in HIS must be exchanged for Honeywell common by mid-1979 if the option has not been previously exercised.

Forrester Reappointed

CAMBRIDGE, Mass. – Jay W. Forrester, inventor of a random-access memory, has been reappointed Germeshausen Professor of Management at MIT's Alfred P. Sloane School of Management for a three-year period.

Forrester holds the basic patent for random-access, coincident-current magnetic storage. He was responsible for the design and construction of Whirlwind 1, and has written several books on systems dynamics.

Executive Corner

MDS Chairman Resigns

HERKIMER, N.Y. – Richard P. Rifenburgh has resigned as chairman and a director of Mohawk Data Sciences Corp. Rifenburgh was previously president and chief executive. He is succeeded in all three posts by V.E. Johnson, who has been president since July.

Other Moves

- Benjamin F. Robelan, vice-president and treasurer of Prime Computer, Inc., has been designated acting president and chief executive officer for the company, following the resignation of Robert C. Baron. Baron will continue to serve as a director and consultant for the firm.

- Otis Page has resigned as vice-president of marketing at Shugart Associates. The action came shortly after the resignation of Alan Shugart as president and member of the board of directors.

  Page remains on the board and is acting as a consultant to the firm. Director of sales Farrell Sanders has assumed marketing responsibilities.

- C.E. Griffin has resigned as executive vice-president of Systems Engineering Laboratories, Inc. Lloyd D. Turner is his successor.

- James MacGuire has resigned as executive vice-president of field operations of Storage Technology Corp. but will continue as a consultant to the firm on special projects and as a director.

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Softening Mini Market Affecting Pertec

By Marvin Smalheiser
CW West Coast Bureau

LOS ANGELES – A softening in the minicomputer market has caused a slowdown in orders for Pertec Corp.'s Peripheral Equipment Division (PED), but its Business Systems Division (BSD) is still going strong.

Stockholders at the annual meeting were told by Ryal R. Poppa, Pertec's president, that the PED has laid off 30 full-time employees as a result of the slowdown.

But the BSD is still working hard at expanding its manufacturing capability for what Poppa described as the largest backlog in the division's history, due in large part to orders for the company's shared-processor key-to-disk system.

When asked about the company's flexible disk drive, Poppa said, however, that it has not yet been as successful as anticipated.

Forecasted revenues of $1 million for fiscal 1975 from the drive have been revised down to $700,000, he added.

"We need more time. It was not the market for 1974. We believe the [flexible disk drive] market will begin in 1975 and there will be a major surge in 1976," he said.

The economy should remain sluggish for about six months and then start a slow pullout, Poppa added.

He does not look for a significant fallout of companies during the current recession, although "a number of smaller companies could get into trouble."

Revenues for Pertec's first quarter were reported at $10 million, a 27% increase over $7.9 million for the same period last year.

Net income was $341,000 or 11 cents a share compared with $458,000 or 15 cents a share in the year-ago period.

"We had expected consolidated profits to be slim for the first quarter in view of heavy costs associated with a dramatically increasing manufacturing requirement at our BSD," Poppa said.

"Our PED however, had an excellent first quarter and as a result consolidated profits were 2 cents per share more than anticipated."

Poppa said that overall the company is expecting to have a "very profitable year."

Earnings Drop as Predicted at CA For First Decline in 13 Quarters

IRVINE, Calif. – As predicted, Computer Automation, Inc. showed its first earnings decline in 13 quarters with earnings of $195,288 or 12 cents a share.

This represents a 51% drop from the $396,780 or 24 cents a share in the first quarter of fiscal 1974.

However, sales for the quarter rose 32% to $5.1 million from $3.9 million in the year-ago period.

David H. Methvin, president, attributed the earnings drop to lower than expected shipments of the firm's minicomputers, brought on by the tight money situation, "uncertain economic conditions" and the company's own restrictions on customer credit, which have had the short-term effect of delaying some shipments.

Also, R&D expenses were also higher than normal during the quarter, ranging above the firm's traditional outlay of about 10% of sales.

In the past two months, expenses have been brought in line with sales through a reduction in the workforce, from about 440 to about 360 people.

Computer Automation cut short-term bank debt by about $1 million during the last quarter, and further reductions are planned.

Memorex Makes Financial Gains

SANTA CLARA, Calif. – Although results for the third quarter at Memorex, Inc. were "not satisfactory," significant gains were made in the firm's overall financial condition, Robert C. Wilson, Memorex's president, said.

A $900,000 credit stemming from debt restructuring reduced Memorex's third-quarter loss to $143,000 or 3 cents a share compared with $3.9 million or 89 cents a share in the year-ago period.

Revenues rose 30% to $56.2 million from $43.2 million in the same 1973 period. Most of the increase was from sales, which rose to $31.1 million from $19.2 million, rather than rental and service revenues.

Wilson pointed out indebtedness to senior lenders was reduced by more than $56.7 million during the quarter.

Data 100, Odec Change Terms of Acquisition

MINNEAPOLIS – Data 100 Corp. has restructured terms of its agreement to acquire Odec, Inc., maker of impact line printers, according to Edward D. Orenstein, president of Data 100 and Alfred J. Petteruti, chairman of Odec.

Under the new proposal, Data 100 will issue approximately 41,000 shares of preferred stock for all of the 1.9 million outstanding common shares of Odec instead of an exchange of common shares as previously announced.

The preferred shares will be redeemable for cash or Data 100 common stock on a formula basis.

The merger will be accounted for as a purchase rather than on a pooling-of-interests basis as previously announced. The proposed transaction, which is subject to the approval of Odec's 650 shareholders, is planned to be completed by the year's end.

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Earnings Reports

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Three Months Ended Sept. 28

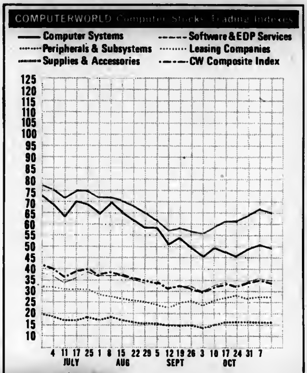
	1974	a1973
Shr Ernd	$.20	$.68
Revenue	17,685,000	15,465,000
Earnings	457,000	1,517,000
9 Mo Shr	1.45	1.54
Revenue	56,959,000	40,972,000
Earnings	3,244,000	3,418,000

a-Restated to apply effective tax rate for the year to interim quarters.

SYCOR

Three Months Ended Sept. 30

	1974	1973
Shr Ernd	$.54	$.47
Revenue	10,337,800	8,652,100
Tax Cred	585,000	546,700
Earnings	1,497,800	1,285,200
9 Mo Shr	1.33	.51
Revenue	29,466,100	22,880,900
Spec Chg	.....	a2,060,000
Tax Cred	1,450,000	1,441,700
Earnings	3,695,800	1,308,000



HONEYWELL

Three Months Ended Sept. 30

	1974 (000)	1973 (000)
Shr Ernd	$.67	$1.17
Revenue	821,233	587,521
Spec Cred	569	774
Earnings	12,980	22,278
9 Mo Shr	2.81	3.16
Revenue	1,865,384	1,691,381
Spec Cred	2,402	2,835
Earnings	53,977	60,015

IBM

Three Months Ended Sept. 30

	1974 (000)	1973 (000)
Shr Ernd	$3.23	$2.81
Revenue	3,125,242	2,755,850
Earnings	477,273	409,895
9 Mo Shr	9.45	7.59
Revenue	9,387,021	7,753,026
Earnings	1,391,101	1,106,745

BARRY WRIGHT

Three Months Ended Sept. 30

	1974	1973
Shr Ernd	$.29	$.23
Revenue	10,934,665	9,183,936
Earnings	479,943	375,239
9 Mo Shr	.83	.77
Revenue	33,686,169	28,126,938
Spec Cred	.....	a64,033
Earnings	1,357,461	1,263,736

a-From the sale of land.

BURROUGHS

Three Months Ended Sept. 30

	1974 (000)	1973 (000)
Shr Ernd	$.66	a$.55
Revenue	346,710	302,973
Earnings	25,815	21,242
9 Mo Shr	2.08	a1.72
Revenue	1,048,546	891,727
Spec Cred	.....	b2,475
Earnings	81,121	66,174

a-Reflects a two-for-one stock split in April 1974. b-Gain from the sale of securities.

TRW

Three Months Ended Sept. 30

	1974 (000)	1973 (000)
aShr Ernd	$.79	$.69
Revenue	630,200	538,100
Earnings	28,200	23,600
a9 Mo Shr	2.11	2.10
Revenue	1,838,700	1,595,100
Earnings	75,000	72,200

a-Fully diluted.

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Computerworld Stock Trading Summary

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EXCH		PRICE 1974 RANGE (1)	CLOSE NOV 14 1974	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	83-217	80 7/8	-3 1/8	-3.7
O	COMPUTER AUTOMATION	3- 14	2 7/8	- 5/8	-17.0
N	CONTROL DATA CORP	13- 30	13 1/8	-3 1/4	-10.8
N	DATA GENERAL CORP	13- 38	18 3/4	-2 1/4	-11.0
O	DATAPOINT CORP	7- 15	8 1/2	-1 1/4	-10.1
O	DIGITAL COMP CONTROL	2- 5	2	- 1/8	-5.0
N	DIGITAL EQUIPMENT	51-121	81 1/8	-4 1/8	-8.3
N	ELECTRONIC ASSOC.	2- 3	1 3/4	+ 1/4	+16.6
A	ELECTRONIC ENGINEER.	5- 11	8	- 1/8	-2.0
N	FOXBORO	18- 40	28 1/2	- 3/4	-2.7
O	GENERAL AUTOMATION	9- 40	8 1/4	-2 1/4	-18.5
O	GRI COMPUTER CORP	1- 2	1/4	0	0.0
N	HEWLETT-PACKARD CO	58- 90	58	-6 1/8	-9.5
N	HONEYWELL INC	22- 88	23 3/4	-1 1/4	-5.0
N	IBM	152-251	182 1/8	-5 1/8	-2.7
O	INTERDATA INC	8- 22	13 5/8	- 5/8	-4.3
O	MICRODATA CORP	2- 5	1 3/4	- 3/8	-17.6
R	NCR	17- 40	17 3/8	- 5/8	-3.4
N	RAYTHEON CO	21- 38	28 1/8	- 3/4	-2.7
R	SINGER CO	12- 40	13 3/8	+ 1/4	+1.8
R	SPERRY RAND	24- 44	28 1/4	- 1/2	-1.7
A	SYSTEMS ENG. LABS	1- 3	1 1/4	0	0.0
N	TEXAS INSTRUMENTS	80-118	75 7/8	-1 3/4	-2.2
O	ULTIMACC SYSTEMS INC	1- 2	1	+ 1/4	+33.3
N	VARIAN ASSOCIATES	8- 13	7 1/2	0	0.0
N	WANG LABS.	7- 20	9 3/8	- 5/8	-6.2
R	XEROX CORP	81-127	85 3/4	- 3/4	-1.1

LEASING COMPANIES

EXCH		PRICE 1974 RANGE (1)	CLOSE NOV 14 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	BRESNAHAN COMP.	2- 2	2 1/8	0	0.0
O	COMDISCO INC	1- 7	1	- 1/4	-20.0
A	COMMERCE GROUP CORP	3- 8	2 3/4	0	0.0
O	COMPUTER EXCHANGE	1- 1	1/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 4	3/4	+ 1/8	+20.0
O	COMP. INSTALLATIONS	1- 1	1/4	0	0.0
R	DATRONIC RENTAL	1- 1	7/8	- 1/8	-12.5
A	DCL INC	0- 1	1/4	-	-18.5
R	DPF INC	2- 5	3	+ 1/8	+4.3
O	EDP RESOURCES	2- 3	3 1/4	0	0.0
A	GRANITE MGT	1- 3	1 1/4	+ 3/8	+42.8
A	GREYHOUND COMPUTER	2- 8	2 1/2	0	0.0
A	ITEL	3- 8	4 1/2	- 1/8	-2.7
N	LEASCO CORP	5- 12	7 1/4	- 7/8	-10.7
O	LEASPAC CORP	0- 2	5/8	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	MRG INC	1- 5	1 5/8	- 5/8	-27.7
A	PIONEER TEX CORP	2- 10	2 1/2	- 1/4	-9.0
A	ROCKWOOD COMPUTER	1- 1	1/2	0	0.0
N	U.S. LEASING	5- 24	11	- 1/2	-4.3

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; R=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1974 RANGE (1)	CLOSE NOV 14 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED CORP TECH	1- 2	3/4	0	0.0
A	APPLIED DATA RES.	1- 3	1 1/4	0	0.0
O	APPLIED LOGIC	1- 1	1/8	0	0.0
N	AUTOMATIC DATA PROC	21- 57	31 1/2	-2 3/8	-7.0
O	BRANDON APPLIED SYST	1- 1	1/4	0	0.0
O	CENTRAL DATA SYSTEMS	4- 8	3	0	0.0
O	COMPUTER DIMENSIONS	1- 3	1 3/4	+ 1/4	+16.6
O	COMPUTER HORIZONS	1- 5	1 1/4	0	0.0
O	COMPUTER NETWORK	1- 2	1/2	- 1/2	-50.0
N	COMPUTER SCIENCES	2- 4	2 1/4	- 1/8	-5.2
O	COMPUTER TASK GROUP	1- 1	3/8	- 1/8	-25.0
O	COMPUTER TECHNOLOGY	1- 1	1/2	0	0.0
O	COMPUTER USAGE	2- 4	2 1/2	- 1/4	-9.0
O	COMRESS	1- 1	1/4	0	0.0
O	COMSHARE	2- 4	2 3/4	+ 3/8	+15.7
N	CORDURA CORP	1- 4	1 3/8	0	0.0
O	DATATAB	1- 3	1 1/8	0	0.0
A	ELECT COMP PROG	1- 1	1/4	0	0.0
N	ELECTRONIC DATA SYS.	11- 25	14 1/4	- 3/4	-5.0
O	INFONATIONAL INC	1- 2	3/8	0	0.0
O	I.D.A. DATA CORP	1- 1	1/4	0	0.0
O	IPS COMPUTER MARKET.	1- 1	1/2	0	0.0
O	KEANE ASSOCIATES	2- 4	1 3/4	0	0.0
O	KEYDATA CORP	1- 8	1 7/8	0	0.0
O	LOGICON	2- 5	2 1/2	0	0.0
A	MANAGEMENT DATA	1- 2	1 1/4	+ 1/8	+11.1
O	NATIONAL CSS INC	6- 37	6	-1	-14.2
O	NATIONAL COMPUTER CO	1- 1	1/4	0	0.0
A	ON LINE SYSTEMS INC	18- 30	18 1/8	-1 3/4	-8.8
N	PLANNING RESEARCH	2- 3	2 1/4	0	0.0
O	PROGRAMMING & SYS	1- 1	3/4	+ 1/8	+20.0
O	RAPIDATA INC	1- 5	1 7/8	- 1/4	-11.7
O	SCIENTIFIC COMPUTERS	1- 1	1	+ 1/8	+14.2
O	SIMPLICITY COMPUTER	1- 1	1/2	- 1/8	-20.0
O	TCC INC	1- 1	1/8	0	0.0
O	TYMSHARE INC	8- 12	7 1/4	- 3/8	-4.8
O	UNITED DATA CENTER	2- 4	2 1/2	- 3/8	-13.0
A	URS SYSTEMS	2- 4	2	0	0.0
R	WYLY CORP	2- 5	2	+ 1/8	+6.6

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1974 RANGE (1)	CLOSE NOV 14 1974	WEEK NET CHNGE	WEEK PCT CHNGE
R	ADDRESSOGRAPH-MULT	4- 11	4 3/8	- 1/8	-2.7
O	ADVANCED MEMORY SYS	1- 7	1 1/2	- 1/4	-14.2
N	AMPEX CORP	3- 5	3 1/8	- 1/8	-3.8
O	ANDERSON JACOBSON	2- 4	2	0	0.0
O	BEEHIVE MEDICAL ELEC	2- 7	2 7/8	0	0.0
A	BOLT,BERANEK & NEW	5- 9	5	- 5/8	-11.1
N	BUNKER-RAMO	4- 8	4 1/2	- 1/8	-2.7
A	CALCOMP	5- 11	5 5/8	- 3/8	-6.2
O	CAMBRIDGE MEMORIES	4- 18	4 5/8	-1 1/4	-21.2
O	CENTRONICS DATA COMP	7- 23	12	+ 1/2	+4.3
O	CODEX CORP	8- 15	14	-1 1/4	-8.1
O	COGNITRONICS	1- 2	5/8	0	0.0
O	COMPUTER COMMUN.	1- 2	1/2	0	0.0
A	COMPUTER EQUIPMENT	1- 2	1 1/4	+ 1/8	+11.1
O	COMPUTER MACHINERY	1- 5	2	- 1/2	-20.0
O	COMPUTER TRANSCEIVER	1- 2	3/4	- 1/8	-14.2
N	CONRAC CORP	10- 22	13 5/8	+ 3/8	+2.8
O	DATA ACCESS SYSTEMS	2- 3	2 1/2	0	0.0
O	DATA 100	5- 13	8 3/8	- 1/8	-1.0
A	DATA PRODUCTS CORP	3- 4	2 7/8	+ 1/8	+4.5
O	DATA RECOGNITION	1- 1	1/4	0	0.0
O	DATA TECHNOLOGY	2- 4	1 3/4	- 1/8	-6.6
O	DECISION DATA COMPUT	3- 13	3 7/8	- 1/8	-3.1
O	DELTA DATA SYSTEMS	1- 2	5/8	0	0.0
O	DI/AN CONTROLS	1- 2	1/2	0	0.0
N	ELECTRONIC M A M	2- 4	1 1/2	- 1/8	-7.6
O	FABRI-TEK	1- 3	5/8	0	0.0
O	GENERAL COMPUTER SYS	1- 4	2	- 1/4	-11.1
R	GENERAL ELECTRIC	30- 65	37 1/2	-1 7/8	-4.7
R	HAZELTINE CORP	3- 7	2 7/8	- 3/8	-11.5
O	INFOREX INC	2- 5	2	- 1/8	-5.8
O	INFORMATION DISPLAYS	1- 1	1/8	0	0.0
O	INFORMATION INTL INC	6- 14	7 1/4	- 1/2	-6.4
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/8	0	0.0
N	MEMOREX	2- 5	2 7/8	+ 1/8	+4.5
A	MILGO ELECTRONICS	8- 18	8 1/4	- 1/2	-5.7
R	MOHAWK DATA SCI	1- 4	1 3/4	+ 1/4	+16.6
O	ODEC COMPUTER SYST.	1- 3	1	0	0.0
O	OPTICAL SCANNING	3- 6	2 3/8	0	0.0
O	PERTEC CORP	2- 8	2	0	0.0
A	POTTER INSTRUMENT	1- 5	1 5/8	- 5/8	-27.7
O	PRECISION INST.	1- 3	3/4	0	0.0
O	QUANTOR CORP	2- 8	2 1/2	- 1/4	-9.0
O	RECOGNITION EQUIP	2- 5	2 3/8	- 3/8	-13.6
R	SANDERS ASSOCIATES	2- 8	2 3/4	- 1/4	-8.3
O	SCAN DATA	1- 2	1	+ 1/8	+14.2
O	STORAGE TECHNOLOGY	7- 15	7 1/2	-1 1/4	-14.2
O	SYCOR INC	4- 13	5 3/4	- 1/2	-8.0
O	TALLY CORP.	1- 4	1 3/8	- 1/8	-8.3
O	TEC INC	2- 7	2 1/2	0	0.0
R	TEKTRONIX INC	21- 48	22	-1 1/2	-6.3
R	TELEX	3- 4	3 3/8	- 1/4	-6.8
O	WANGCO INC	5- 13	4 1/2	- 3/8	-7.6
O	WILTEK INC	2- 8	1 3/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1974 RANGE (1)	CLOSE NOV 14 1974	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- 8	4 1/2	- 1/4	-5.2
A	BARRY WRIGHT	4- 7	4 1/2	0	0.0
O	CYBERMATICS INC	1- 2	5/8	+ 1/8	+25.0
A	DATA DOCUMENTS	23- 54	34	-5 7/8	-14.7
O	DUPLEX PRODUCTS INC	8- 17	14 5/8	- 3/4	-4.8
R	ENNIS BUS. FORMS	4- 7	4 7/8	- 1/4	-4.8
O	GRAHAM MAGNETICS	8- 11	8 3/4	- 1/4	-3.5
O	GRAPHIC CONTROLS	6- 11	8 3/4	-1	-10.2
N	3M COMPANY	47- 79	57	-3	-5.0
O	MOORE CORP LTD	33- 57	40 1/2	-1	-2.4
N	NASHUA CORP	24- 45	28 3/8	- 3/8	-1.4
O	REYNOLDS & REYNOLD	8- 35	9 1/2	-1 1/2	-13.6
O	STANDARD REGISTER	10- 18	13 1/2	0	0.0
O	TAB PRODUCTS CO	5- 11	8	0	0.0
N	UARCO	13- 23	19 3/4	- 1/4	-1.2
A	WABASH MAGNETICS	3- 7	3 3/4	0	0.0
N	WALLACE BUS FORMS	14- 24	15 3/8	- 7/8	-5.3

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